HSF-88-03

# Changeable Message Signs

## — A Driver Preference Survey

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# Technical Report Documentation Page

# Changeable Message Signs

## — A Driver Preference Survey

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| Abstract: | The Ministry of Transportation of Ontario is in the process of implementing a freeway traffic management system (FTMS) on Highway 401 in Toronto. The FTMS utilizes changeable message signs (CMS) to communicate with the driver and this report describes the results of a questionnaire survey on the kind of information drivers would like to see.<br>A pre-tested questionnaire was administered to drivers who were renewing their driving licences at three licensing offices in Toronto. The drivers answered questions about:<br>1. the kind of information they would like to see about traffic incidents;<br>2. how far in advance of those incidents such information should be given;<br>3. their interpretation of phrases commonly used on CMS;<br>4. their response to various diversionary and advisory messages.<br>A total of 539 drivers were surveyed and where comparisons could be made with corresponding literature, results from the survey were quite consistent with earlier work. In addition, the questionnaire was translated (except for the English messages) so that small groups of Italian-speaking and Chinese-speaking drivers (40 each) could be surveyed.<br>While this survey provides useful feedback about the kinds of information drivers preferred, and about distances at which advance information should be given as well as interpretations of two common types of messages, it does not answer all the pertinent questions. Other issues to be resolved are the legibility and comprehensibility of candidate messages. |
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## — A Driver Preference Survey

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# Executive Summary

The Ministry of Transportation of Ontario is in the process of implementing a Freeway Traffic Management System on Highway 401 in Toronto that includes a changeable message sign (CMS) system. This report is of a project to ascertain the kind of messages drivers preferred for describing traffic incidents on the highway.

As part of this project a literature review was undertaken, the results of which were used to develop a questionnaire on driver preference. The questionnaire was first pilot-tested on a group of 40 drivers who were selected from drivers renewing their licences at Queen's Park licensing office in Toronto. As a result, the questionnaire was revised, primarily shortened and made clearer. The main survey was carried out at three driver licensing offices in Toronto: Scarborough, Downsview, and Brampton. Questions were asked about:

1) driver preference for the kinds of information they would like to see about traffic incidents;

2) the distance in advance of those incidents such information should be given;

3) driver interpretation of phrases commonly used on changeable message signs;

4) driver response to various diversionary and advisory messages.

Surveyors randomly selected drivers applying to renew their licences, and were present during all hours the offices were open to ensure the sample would be representative of Metropolitan Toronto drivers. A total of 539 drivers were surveyed. In addition to the main survey, the questionnaire was translated (except for the English messages) so that small groups of Chinese and Italian speaking drivers (40 each) could be surveyed. These two groups represent the largest ethnic non-European group (Chinese) and European group (Italian), excluding English and French, in Ontario.

Prior to administering the questionnaire, interviewers determined if drivers were eligible to be participants, that is, they drove cars or trucks primarily and not motorcycles, and drove on Highway 401 at least once a month. Knowledge of how the express/collector lane system works was also assessed. Almost a third of the drivers appeared to misunderstand how the express/collector lane system works, particularly the fact that one can drive all the way across Toronto on the collector lanes.

In the questionnaire completed by the driver, the first two questions asked for driver's preference in describing traffic moving very slowly and traffic moving somewhat slowly. The most preferred phrases were "heavy congestion" and "traffic slowdown", respectively. Six questions asked for driver preference in describing an accident situation; heavy, moderate and minor congestion; typical rush hour traffic and normal free-flowing traffic. For the accident situation drivers preferred, about equally, information on which lanes were blocked ("major accident ahead, left 2 lanes blocked") and the accident location ("major accident ahead, 1 km before Avenue Road"). Information on amount of delay was the least preferred. For the descriptions of heavy, moderate and minor congestion, the options included average traffic speed, probable delay time, probable travel time, and a qualitative description of the level of congestion. For heavy congestion the greatest preference was for the message "heavy congestion, next 3 km" followed by the speed descriptor, "speed 20-40 km/h next 3 km". Similarly, for moderate and minor congestion, drivers most preferred the phrases "moderate congestion" and "minor congestion", with speed descriptors being second preference. For describing rush hour traffic and normal traffic drivers most preferred the messages "rush hour conditions ahead next 5 km" and "normal traffic next 5 km", respectively. In both cases the no message option and the time and weather messages were least preferred, indicating drivers want real-time information, even if it is that the traffic is flowing as expected.

The results of the question on driver preference for advance warning of delays were that equal numbers of drivers preferred to be warned "2 to 3 km" in advance and "4 to 5 km" in advance of the traffic problem.

Three questions asked drivers to imagine themselves traveling in either the express or collector lanes. Various diversionary and advisory messages were presented to which the driver could respond. Options were to slow down immediately, to slow down when they saw the traffic back-up, to take the collector (or express) lanes at the next opportunity, and to exit the highway (only for traveling in the collector lanes). As would be expected, the greatest diversion occurred with messages saying either the collector or express lanes were closed. Diversion very close to this level was associated with the message "heavy congestion" and "moderate congestion" when combined with advice to use the collector lanes. Messages about a major accident or 2 left lanes blocked produced the next highest diversion.

Diversion was higher for messages that indicated heavy congestion started close by (1 or 3 km) or lasted a long distance (10 km). There was less diversion for short sections of heavy congestion (3 km) than for long sections of moderate congestion (10 km). Drivers did not differentiate between messages referring to "moderate congestion" and those referring to "minor congestion". Interestingly, a message about construction ahead produced as much diversion as the message "heavy congestion clears in 10 km" indicating drivers perceive construction as being very disruptive to traffic. Thus messages referring to construction should not be used unless major disruption is in fact likely to result from the construction itself. Though "speed 20-40 km/h" suggests very slow traffic, much less diversion occurred for messages using this phrase than occurred when the phrase "heavy congestion" was used. Respondents appeared to interpret the traffic problem described by "speed 20-40 km/h" as halfway between heavy and moderate congestion.

Wherever a message contained specific advice, eg., "reduce delay, take the collector lanes" or "reduce speed", the number of drivers responding that they would follow the advice increased, compared to the same message offered without the advice.

Two questions were asked to determine driver's interpretation of two phrases frequently used on changeable message signs, "speed 30-40 km/h, next 3 km" and "heavy congestion, next 3 km". A slight majority of the respondents thought the speed message referred to the average traffic speed, which is what this message is usually intended to convey. However, almost as many thought the message referred to recommended speed and almost one-fifth thought it referred to the legal speed. The second message was correctly interpreted by the majority of respondents, but about one quarter thought it meant that congestion started, rather than ended, in 3 km.

The effects of questionnaire order, respondent age, sex, and education level on preference were assessed. In the majority of cases, there were no effects. In the few cases where one of these variables affected preference, or response, the effect was minor. Unfortunately the percentage of respondents with public school education was low compared to what might be expected in the driving population. Since there are suggestions in the literature that words such as "congestion" may be less preferred by this group, the low numbers in this group should be noted.

Respondents were also asked for their general comments on changeable message signs. The concept received a lot of unprompted support: 69 respondents said in various ways the signs were a good idea. Additionally, considerable support was expressed for the existing signs on the Queen Elizabeth Way (QEW). Doubt about the concept was expressed by 18 respondents, with regard to cost, whether or not taxpayers wanted them and the reliability of the information to be displayed. Negative comments were made by 11 respondents who felt improvements should be made in the existing system and the number of signs should be minimized. In addition, suggestions were made about sign visibility, clarity of messages, information in the messages, and improvement to the Highway 401 system.

The results from the Italian-speaking participants were very close to those obtained from the main survey. Due, in part to the similarity of the Italian and English versions of many of the key words used in the messages, Italian-speaking respondents had little difficulty understanding the messages. In contrast, the results of the Chinese speaker survey were very different from those of the main survey. As might be expected from the major differences between written English and written Chinese, English messages were not understood by anywhere from 10-50% of respondents, even though the respondents held driver's licences and drove on Highway 401 frequently. The lack of understanding certainly affected preference, in many cases greatest preference being shown for messages which the majority understood.

In conclusion, this survey provides useful information about driver preference for types of information, distances at which advance information should be given as well as driver interpretation of two commonly used messages. Where comparisons could be made with the literature, results from the survey were quite consistent with earlier work.

In terms of driver response to diversionary and advisory messages it must be emphasized that the findings of the survey cannot be used to predict absolute diversion rates for different messages. Drivers actually on the highway may respond differently. Drivers will certainly change their responses during the introduction of the changeable message sign system as they learn the traffic patterns associated with the various messages. The findings of this survey can, however, be used to predict relative diversion. It is clear for example that drivers do not differentiate between the terms "moderate" and "minor" congestion. They do respond differently to different lengths of congestion. They are more likely to take an action when explicitly told to do so, for example to take the collectors when a message about heavy congestion is combined with this advice, or to reduce speed when so instructed.

It must also be emphasized that while this survey provides some basis for developing CMS messages to be used on Highway 401, it does not answer all the important questions. Other issues which need to be settled when the first candidate messages are generated are:

- Can the messages be read quickly?

- Are all abbreviations commonly understood?

- Are all the messages comprehended by drivers, particularly those with less than high school education?

# 1/ Introduction

The Ministry of Transportation is in the process of adding a changeable message sign (CMS) system to Highway 401. The changeable message signs will be an integral component of a Freeway Traffic Management System which will use cameras and detectors in the road to detect traffic problems. As part of this project, a literature review on changeable message signs was undertaken and the results of this review were used to develop a questionnaire on driver preference. This questionnaire was given to over 500 drivers who were familiar with Highway 401 to help determine various aspects of CMS messages that are important to drivers.

The major aspects of driver preference uncovered in the literature survey which influenced the design of the questionnaire were as follows. Three studies examined preference for the type of information drivers desired to describe traffic congestion. Heathington et al (1970), in a study involving 732 Illinois drivers, evaluated descriptors for heavy congestion, moderate congestion and no congestion. Traffic condition (stop and go, heavy congestion), speed, travel time, delay time and no message descriptors were used. For heavy congestion the descriptor "accident-heavy congestion - next 3 miles" was most preferred. For moderate and no congestion the speed descriptor was most preferred with the traffic condition descriptors second and third preference. In all cases some real-time information was preferred over a blank sign, and travel and delay time descriptors were least preferred. Effects due to sex, daily/non-daily use of the freeway, education level, age, and total yearly miles in the Chicago area were examined. Subgroups were consistent in their preferences with two exceptions. The descriptor "accident-heavy congestion - next 3 miles" was most preferred in 7 of 9 subgroups but ranked second for drivers over 60 years of age and third for drivers with an eighth grade education or less. Both of these groups ranked the speed descriptor first for the level of heavy congestion.

A second study of driver preference confirmed the findings that delay time and travel time descriptors were least preferred (Dudek et al, 1971). Of the 5 types of alternative information offered, drivers most preferred to know the location and length of congested areas and the degree of congestion.

A third study by Hulbert and Beers (1971) found drivers desired messages that were short, simple and specified the appropriate action. In order of preference, drivers preferred information on lane blockage (if any), distance from the problem, time of delay, reason for delay and location. As was also shown by Heathington et al (1970), drivers preferred real-time information to a blank sign even when traffic was normal. A combined field and questionnaire study by Stockton et al (1975) further confirmed this finding. This latter study also showed the majority of drivers would be interested in being told the number of miles ahead the traffic problem cleared.

Prior to the questionnaire survey described in this report no literature was found indicating that drivers have been asked how they would respond to different sign messages. Field studies have been done, however, looking at the increase in diversion created by signs. Three studies, Turner et al (1978), Dudek et al (1981), and Dudek et al (1982), have looked at diversion in response to signs during maintenance operations, special events and during traffic tie-ups. Results were highly variable ranging from large increases in diversion compared with "natural diversion" (occurring under the no sign conditions) to no difference at all. The study described below examines what drivers say they will do when given various messages. Such information cannot be used to predict absolute levels of diversion which will result from use of the signs, first, because naturally occurring diversion must be accounted for and second, even more important, because drivers do not necessarily do what they say they will do in real traffic conditions. However, the information from responses can be used to determine relative diversion given different sign messages.

The findings of the literature review described above were used to develop a questionnaire to determine:

1) driver preference for the kinds of information they would like to see about traffic incidents;

2) the distance in advance of those incidents such information should be given;

3) driver interpretation of phrases commonly used on changeable message signs;

4) driver response to various messages.

The various types of information a driver might prefer were determined from the studies by Heathington et al (1970), Dudek et al (1971) and Hulbert and Beers (1971), and included: degree of congestion, lane blockage, speed, travel time and delay time.

The sign system envisioned for Highway 401 is more extensive than any of those that have yet been studied and allows for information about an incident to be presented many kilometres in advance. This study was the first to include the second question, the distance in advance of the incident drivers wished to receive information.

CMS messages are of necessity short, and can sometimes be ambiguous. Driver understanding of commonly used phrases on CMS has not yet been examined. This was the third area of questionning included in the questionnaire.

Finally, driver's response to a total of 28 different messages under three different driving scenarios was examined. Again, this information has not been determined in previous studies.

Survey participants were 539 drivers who used Highway 401. The introduction of a photo licence system in Ontario provided an ideal opportunity to obtain a random sample of drivers for the purposes of this survey. One in three drivers renew their licence each year. For this year (1987) and the next two years drivers have to come to a driver licensing office to obtain their photo licence. The questionnaire was designed so that it could be filled in by drivers in about 15-20 minutes while they waited in line in the driver licensing office. To ensure a random sample of drivers, surveyors were present during all hours the offices were open. Demographic data were collected to check that the sample was representative of the driving population in age, sex and education level. Besides these variables, data on two other variables, current driving experience (km/year) as well as current use of Highway 401, were collected. Education level and age have been shown to affect driver's preference for particular sign messages (Heathington, Worrall and Hoff, 1970). The effect of driving experience, both overall and specific to highway driving, on preference was not found to be significant in the Heathington et al study. However, to confirm this these variables were also collected in this survey.

Prior to the main survey a short pilot survey was carried out to ensure the questions were easily understood and the questionnaire took an acceptable amount of time to complete.

# 2/ Pilot Study

The pilot survey was carried out over a 2-day period at the Queen's Park driver licensing office in Toronto. A total of 40 questionnaires were given out to drivers who came to renew their licences, as well as to other people accompanying them. Questionnaires were handed out as follows: 5 in the period 8:30 AM - 11:00 AM, 10 between 11:00 AM - 2:00 PM and 5 between 2:00 PM - 4:30 PM. This corresponded with the relative numbers of drivers being serviced during these periods.

## 2.1/ Interview Portion of the Questionnaire

Prior to completing the questionnaire drivers were first asked a series of questions by the interviewer (see Appendix A1). The first question determined how often they drove on Highway 401. Drivers who drove on the 401 less than once a month were not interviewed further. It seemed unreasonable to ask people who did not use the 401 at least this much for their preference about certain aspects of changeable message signs. The second question determined whether interviewees drove more or less than 10,000 km a year. This question was asked by the interviewer rather than in the questionnaire because it was thought some drivers might have trouble determining which category they fit into and could be prompted.

The next seven questions attempted to determine whether drivers understood the express/collector lane system, in particular the fact that the express and collectors are essentially two parallel roadways in the Toronto area, that the express lanes can only be entered (and exited) at certain points, from the collector lanes and not directly from a city street, and that both types of lanes have the same speed limit. Because so many of the messages in the questionnaire assumed knowledge of the express/collector lane system it seemed prudent to be sure that people understood the system before asking them about it.

Any interviewees who expressed concern about the confidentiality of their answers or the reason for the survey were given a letter from the Ontario Ministry of Transportation and Communications (now Ontario Ministry of Transportation) which addressed these concerns and provided them with a contact person (See Appendix A2).

The interview portion of the questionnaire lasted a few minutes, after which drivers who qualified for the survey were given the questionnaire to complete while they waited in the various queues to obtain their photo licence.

## 2.2/ Questionnaire

The questionnaire used in the pilot survey is shown in Appendix A3 together with the tabulations of responses. The front page of the questionnaire began with an introduction explaining its purpose, followed by an illustrated description of how the express/collector lane system on Highway 401 works. This was intended to clear up any confusion about the system which had been revealed during the interview portion of the survey. Participants then filled in age group, sex and education level.

The first 6 questions required participants to rank their preference for particular types of information (delay time, length of congested area, location of accident, etc.) for a number of situations: a major accident; heavy, moderate and minor congestion; normal rush hour traffic and normal free-flowing traffic. Questions 7 through 9 asked participants to imagine they were driving in specific lanes (express or collector) on Highway 401 either in a hurry or not, either traveling all across Toronto or only a short distance. Participants were asked how they would respond if they saw various sign messages. Possible responses were slowing down immediately, slowing down when the traffic started backing up, taking the other lanes, or exiting the highway. Participants were only allowed to select one course of action in response to each message. Question 10 asked about how far in advance of unusual congestion respondents thought information about the delay should be given to them. Questions 11 and 12 were concerned with drivers' preference for the words used to describe heavy and moderate congestion. Messages on CMS must be kept short both for reasons of physical space and limitations in drivers' time to read the messages; this sometimes leads to the message being ambiguous. Questions 13 and 14 examined drivers' understanding of two commonly used phrases.

## 2.3/ Debriefing After Questionnaire Completion

Once the respondent completed the questionnaire the interviewer asked a series of questions to determine the following: (See Appendix A4).

1) was the length of the questionnaire acceptable?

2) were any particular questions difficult to understand, too long, or too similar to other questions?

3) should people be paid to fill in the questionnaire?

## 2.4/ Results of the Interview Portion of the Questionnaire

Of 40 questionnaires handed out, 38 were completed. Of 37 participants, 31 drove on the 401 less than daily but more than once a month. Only 6 drove on the 401 daily. One third of the participants drove less than 10,000 km per year, the rest, more. Approximately 80% of drivers understood the way the express/collector lane system worked. A total of 88 people refused or were ineligible to participate, 5 because of language difficulties, 18 because they used Highway 401 less than once a month, and most of the remainder because they were in a hurry. Three people started the questionnaire and gave up half way through it, one person left with the questionnaire.

## 2.5/ Results of the Questionnaire

The questionnaire tabulations are shown in Appendix A3 on the questionnaire used. In summary, results from the questions on driver preference indicated the most preferred messages for describing a major accident were "major accident ahead, 1 km before Avenue Road", for very congested traffic "heavy congestion next 3 km", for somewhat congested traffic "moderate congestion next 3 km", for slightly congested traffic "minor congestion next 3 km", for rush hour traffic "normal rush hour conditions ahead next 5 km", and for free-flowing traffic "normal traffic next 5 km". A blank sign, safety messages, time and weather messages, and messages giving directions available on nearby static signs were least preferred. Comments from the debriefing process indicated the preference questions offered too many choices to be ranked and were too similar to each other. As a result, these questions were shortened by dropping the least preferred options. Also the ranking task was broken up with other non-ranking questions.

Results from the questions on driver response were first, when people are explicitly advised to divert or to slow down the majority say they will. Second, respondents clearly differentiated between heavy congestion and moderate or minor congestion but not between moderate and minor congestion. The heavy congestion message produced high diversion, particularly if the congestion was indicated as starting close by (1 km or 3 km) or occurring over a long distance (10 km). However when the message was "heavy congestion starts in 1 km, reduce speed", far fewer respondents said they would divert, possibly because they assumed that the advice to reduce speed was given because the collector lanes were also congested. Third, respondents clearly differentiated between messages about one or two lanes being blocked and between messages about slow speeds (20-40 km/h) for the next 3 km, as opposed to the next 10 km, with almost twice as many diverting from the highway for the more congested conditions. Fourth, respondents did not differentiate between "major accident ahead" and "accident ahead" consistently. Debriefing indicated this portion of the questionnaire was too long. It, too, was shortened and the questions on driver response were broken up by a different type of question.

For traffic moving very slowly and somewhat slowly, respondents most preferred the terms "heavy congestion" and "moderate congestion", respectively. The term "congestion" was used so frequently in the questionnaire that these questions were moved to the start of the questionnaire so the choice of terms would not be influenced by the questionnaire itself.

Results on driver interpretation of messages showed "speed 30 km/h next 3 km" was interpreted as meaning the legal speed limit; to better indicate average traffic speed the phrase "speed 30-40 km/h next 3 km" was used in the main survey.

The effect of offering an incentive for completing the questionnaire was examined. Those who were offered an incentive (Wintario lottery ticket) tended to be less likely to refuse to be interviewed and more likely to do a better job of completing the questionnaire. As a result the incentive was retained for the main survey.

## 3/ Main Survey

As described in the preceding section, the questionnaire was revised in light of the results from the pilot survey. Most questions were shortened, the order of questions was rearranged to make the questionnaire less repetitive and the introductions to questions were made clearer and more concise. Two alternate questionnaires were used to help balance any effect due to the order that messages were shown. Generally it is expected that when items are preference ranked, the first item will more likely be ranked first than the last item.

The form of the interview portion of the questionnaire together with the data collection sheet used in the main survey is shown in Appendix B1. Appendix B2 contains the questionnaire including overall results for each question.

The main survey was carried out in three driver licensing offices in Toronto: Scarborough, Downsview and Brampton. Questionnaires were handed out during the time periods the offices were open to ensure a representative sample. At each location the number of questionnaires given out in the morning, over the noon hour (11:30 - 2:30), and in the afternoon was matched to the number of drivers serviced in those time periods. The Brampton office was open in the evenings as well. The interviewer alternated between covering the morning and afternoon, and the afternoon and evening. Unlike the pilot survey, interviewees were not debriefed after the interview. However, before giving participants a Wintario lottery ticket, the interviewer checked that the questionnaire was properly completed. A record was kept of sex, age, and reason for non-participation for those refusing to participate in the survey. Half of the questionnaires had the order shown in the Appendix B1 and the other half had messages listed in the reverse order. Time period and survey location were both considered in balancing questionnaire order.

A total of 539 people were surveyed, about one third at each location. Demographics of the population surveyed are shown in Table 1. Driver licensing statistics for Ontario indicate about 20% of licensed drivers are 16-25 years of age, 60% are 26-55 and 20% are over 55. As can be seen from Table 1 older participants are under-represented in the survey (10% vs 20%), while the younger participants are over-represented. Towards the end of the survey, an attempt was made to recruit more older people to be interviewed. However, this was difficult as they were found to be much more likely to refuse than other age groups. Female participants were found to be under-represented in the survey (26.9% vs 44.6% licensed) while male participants were over-represented (75.1% vs 55.4% licensed). Subjects with lower levels of education were also under-represented in the survey. Only 4.3% of respondents had public school education while 53.0% had high school education and 42.9% had university or other post-secondary education.

Total participants - 539

Age: **16-25** (n=152) 28.2%

| **Male** | **(117)** | **77.0%** | **Female** | **( 35)** | **23.0%** | **Total** | **(152)** | |
|---|---|---|---|---|---|---|---|---|
| PS | ( 2) | 1.7% | PS | ( 0) | | PS | ( 2) | 1.3% |
| HS | ( 70) | 59.8% | HS | ( 20) | 57.1% | HS | ( 90) | 59.2% |
| U | ( 45) | 28.5% | U | ( 15) | 42.9% | U | ( 60) | 39.5% |

Age: **26-55** (n=334) 62.0%

| **Male** | **(240)** | **71.9%** | **Female** | **( 94)** | **28.1%** | **Total** | **(334)** | |
|---|---|---|---|---|---|---|---|---|
| PS | ( 10) | 4.2% | PS | ( 2) | 2.1% | PS | ( 12) | 3.6% |
| HS | (113) | 47.1% | HS | ( 52) | 55.3% | HS | (165) | 49.4% |
| U | (117) | 48.7% | U | ( 40) | 42.6% | U | (157) | 47.0% |

Age: **>55** (n=53) 9.8%

| **Male** | **(48)** | **90.6%** | **Female** | **( 5)** | **9.4%** | **Total** | **( 53)** | |
|---|---|---|---|---|---|---|---|---|
| PS | ( 9) | 18.7% | PS | ( 0) | | PS | ( 9) | 17.0% |
| HS | ( 27) | 56.3% | HS | ( 3) | 60.0% | HS | ( 30) | 56.6% |
| U | ( 12) | 25.0% | U | ( 2) | 40.0% | U | ( 27) | 26.4% |

**All Ages** (n=539)

| **Male** | **(405)** | **75.1%** | **Female** | **(134)** | **26.9%** | **Totals** | **(539)** | |
|---|---|---|---|---|---|---|---|---|
| PS | ( 21) | 5.2% | PS | ( 2) | 1.5% | PS | ( 23) | 4.2% |
| HS | (210) | 51.8% | HS | ( 75) | 56.0% | HS | (285) | 52.9% |
| U | (174) | 43.0% | U | ( 57) | 42.5% | U | (231) | 42.9% |

Note: PS = public school
HS = high school
U = university or other postsecondary

**Table 1 Survey Demographics**

The 1981 Census of Canada (Statistics Canada) showed that in Metro Toronto 17.8% of adults over 15 had grade 1-8 education. Two reasons for the under-representation might be, first, people with less than grade 8 education may have refused because of the prospect of filling out a written questionnaire with several pages. Second, older people are more likely to have less education and they are under-represented.

## 3.1/ Reasons for Non-Participation

A total of 1236 drivers were asked to participate in the survey of which 539 participated and 697 did not. The main reason for refusing was being in a hurry or not interested (64%). The next most common reason was too infrequent driving on Highway 401 (less than once a month) (16.0%), followed by difficulties communicating in English (13.5%). Other reasons such as not having reading glasses at the time, not driving, mostly driving a motorcycle as opposed to a car or van and being a driving instructor accounted for 6% of the refusals. Older people accounted for 9.9% of the participants but 28.9% of the refusals.

## 3.2/ Interview Portion of the Questionnaire: Results

Appendix B1 contains a copy of the interview portion of the questionnaire together with the results. The first two questions were used to determine whether or not the interviewee was an eligible participant. As was the case in the pilot survey, interviewees had to drive on Highway 401 at least once a month to be eligible. In addition, for the main survey it was decided to exclude people who mainly drove motorcycles since they are known in traffic tie-ups to avail themselves of other means of diverting from their lane, which are not available to car and van drivers. Of the respondents 39% drove on the 401 daily in rush hour, 12% daily but not in rush hour, 32% more than once a week but not daily, and 16.5% between once a month and once a week. Drivers were interviewed during all hours licensing offices were open. Assuming daily commuters were no less likely to refuse to be interviewed than those who drove on Highway 401 less frequently, this breakdown by 401 driving experience should be representative of Metro drivers who drive on the 401 at least once a month.

In answer to the question "when can you change from express to collector lanes?", 86.3% of respondents replied correctly "only at certain points along the road". Only 3.1% replied "never" or "don't know". When questioned about entering express and collector lanes 83.5% of respondents knew express lanes could not be entered directly from a city street and 89.8% knew the collectors could be. The speed limit was thought to be the same on the collector and express lanes by 79.2%. However, a sizable percent (14.3%) thought the speed limits were different. Finally respondents were asked whether they could travel across Toronto in the collector lanes without changing to the express lanes. While 70.9% correctly responded yes, a large group, 20.8% said no and 8.3% said they didn't know. In the case of this question, it is possible some respondents might have been thinking that as the collectors merge with the express lanes on either side of Toronto one couldn't travel right across Toronto on the collectors. However, the answers to the other questions suggests that a sizable group misunderstands how the express/collector lane system works, and some public education in this area might be needed.

At the end of each interview respondents were asked to describe what they would understand from a traffic report describing congestion on Highway 401. This question was added just after the survey started. Only 16 out of approximately 500 respondents who were asked did not understand the word congestion when used in this context. For most of these respondents the problem was linguisitic because English was their second language.

## 3.3/ Questionnaire Results

Appendix B3 contains the questionnaire results for certain variables, in detailed tabular form. The first number of each table refers to the number of that question in the questionnaire. Thus Tables 2.0 through 2.3 contain the results from Question 2. The subset of tables is organised as follows: Table 2.0 contains data for the three age groups as well as the overall results; Table 2.1, data for the 4 levels of driving experience on Highway 401; Table 2.2, data for the 2 levels of total driving exposure and Table 2.3, data for the 3 education levels. For each of the questions, overall results will be discussed first followed by discussion on age, education, driving exposure and questionnaire order effects.

As was the case for the pilot survey data, summaries of percentages only are reported and no statistical analysis was performed on the questionnaire results; differences in findings due to age, education, exposure and order are discussed, but not in terms of statistical significance.

Results were analyzed for differences in response due to sex. The very few differences which were found were all minor. Thus differences due to sex are not individually reported in the rest of this section.

### 3.3.1/ Driver Preference for Descriptors

QUESTION 1: HEAVY CONGESTION MESSAGES (Tables 1.0 - 1.3):

**Overall Ranking:** To describe traffic which was moving very slowly, drivers preferred the words "heavy congestion" (45.6%) over "severe traffic delay" (31.7%) or traffic jam (22.6%). "Traffic jam" was ranked third by 43.6% of respondents.

**Age and Education Effects:** The 16-25 and the 26-55 year old groups most preferred the message "heavy congestion" while the over 55 group showed a slightly greater preference for the descriptor "severe traffic delay" (39.6%) compared to "heavy congestion" (35.8%). The younger the driver, the greater the preference for "heavy congestion" and the greater the number ranking "traffic jam" last.

Education hardly affected preference. All educations groups ranked "heavy congestion" as their most preferred message. The message ranked last by drivers with public school education was "severe traffic delay" whereas for the other two education groups it was "traffic jam".

**Exposure Effects:** No differences in preference for most or least preferred message were found for respondents with differing levels of driving exposure (<10,000 km per year vs >10,000 km per year). Groups at different levels of Highway 401 driving all preferred the term "heavy congestion". The drivers who drove in rush hour daily showed the strongest preference for this descriptor (46.5%).

**Order Effects:** The most and least preferred descriptors were consistent for both questionnaire orders. Slight differences were found in degree of preference, but in an unexpected direction. When "traffic jam" was the third descriptor to appear it was rated higher (24.7%) than when it appeared first (20.4%).

QUESTION 2: MODERATE CONGESTION MESSAGES (Tables 2.0 - 2.3):

**Overall Ranking:** To describe traffic which was moving somewhat slowly, drivers preferred the words "traffic slowdown" (50.5%) over "moderate congestion" (26.9%) or traffic delay (22.6%).

**Age and Education Effects:** The descriptor "traffic slowdown" was most preferred by every age group, with preference being stronger with increasing age. Education level had no effect on preference.

**Exposure Effects:** Neither total driving exposure nor driving experience on the 401 affected the preference for "traffic slowdown" over the other descriptors.

**Order Effects:** For both questionnaire orders "traffic slowdown" was most preferred. The differences between orders were, as with Question 1, in an unexpected direction. The messages "moderate congestion" and "traffic slowdown" were more preferred when in last place than when in first. Differences in both cases were less than 10%.

### 3.3.2 / Driver Preference for Advance Warning of Delays

QUESTION 3: ADVANCE WARNING MESSAGES (Tables 3.0 - 3.3):

**Overall Ranking:** Respondents were asked how far in advance of the start of unusual congestion information about the delay should be given to drivers. Possible answers ranged from less than 2 km up to more than 8 km. The responses "2 to 3 km" and "4 to 5 km" were about equally popular. The responses "less than 2 km" and "more than 8 km" were each chosen by 10% or fewer.

**Age, Education and Exposure Effects:** Drivers over the age of 55, and drivers driving on the 401 more than once a month but less than once a week, preferred an advance warning of 2 to 3 km. Otherwise there was no systematic effect on choice, either from education level or total driving exposure.

**Order Effects:** Order did affect choice somewhat with "2 to 3 km" being more preferred when it was second choice (46.6%) than when it was fourth choice (22.4%). Thus for the first order of presentation (the order shown in the Appendix questionnaire) "2 to 3 km" was chosen by most respondents and for the second order of presentation (choices in reverse order) "3 to 4 km" was most frequently chosen.

### 3.3.3 / Driver Preference for Type of Information

Figures 1 and 2 illustrate the relative ranking of messages for describing a major accident; heavy, moderate, minor congestion; rush hour congestion and normal traffic.

QUESTION 4: MAJOR ACCIDENT MESSAGES (Table 4.0 - 4.3 and Figure 1):

**Overall Ranking:** Two types of information were approximately equally ranked as most preferred. Of the respondents, 36.0% ranked "left 2 lanes blocked" most preferred, while 30.4%

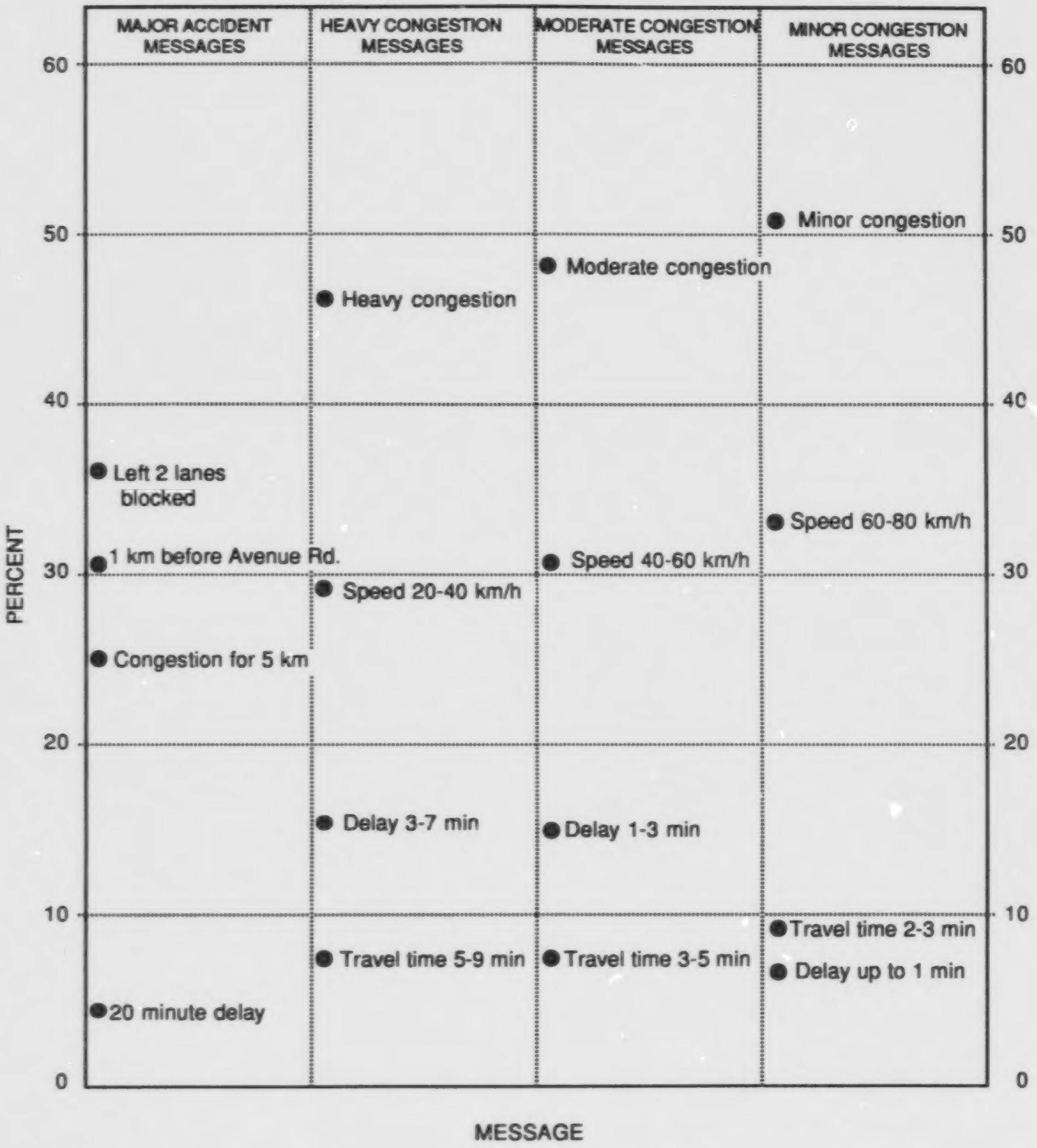

**Figure 1/ Questions 4, 5, 6, 7 — Percent of Drivers Ranking Message as Most Preferred**

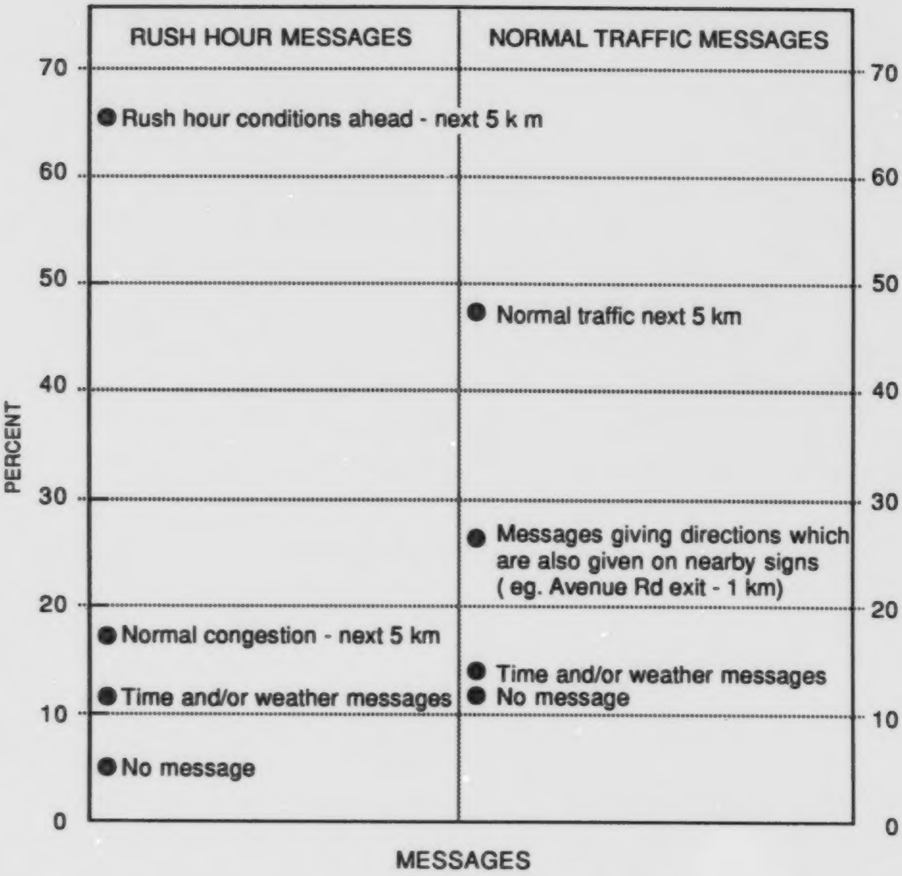

**Figure 2/ Questions 10,11 — Percent of Drivers Ranking Messages as Most Preferred**

ranked "1 km before Avenue Rd" as most preferred. The difference here (5.6%) is small and probably not significant. Third preference was "congestion for 5 km" (25.6%). The least preferred information was "20 minute delay", ranked fourth by 44% of respondents.

**Age and Education Effects:** There were slight differences between age groups. The youngest group equally preferred information about lanes blocked and location while the older two groups showed stronger preference for the lanes blocked message. Level of education did not noticeably affect preference.

**Exposure Effects:** Overall driving exposure did not affect preference. Experience on the 401 did have some effect however. The most frequent and the least frequent users both had stronger preferences for information about lanes blocked, while the group who drove weekly at least but not daily, showed a slightly greater preference for accident location as opposed to which lanes were blocked. Given the closeness of these two messages in the overall ranking such differences between groups is not surprising and probably not of much consequence.

**Order Effects:** Most and least preferred messages were the same no matter what the questionnaire's order. This time however the slight differences between orders were in the expected direction, with messages being ranked higher when they appeared first, rather than last.

QUESTION 5: STOP AND GO TRAFFIC MESSAGES (Tables 5.0 - 5.3 and Figure 1):

**Overall Ranking:** The most preferred information about stop and go traffic was "heavy congestion next 3 km" (47.5%). The next most preferred was "speed 20-40 km/h next 3 km" (29.5%) followed by "delay 3 to 7 minutes next 3 km" (15.0%) and "travel time 5-9 min. next 3 km" (8.0%).

**Age and Education Effects:** Preferences for most and least preferred kinds of information were consistent across age groups and education levels.

**Exposure Effects:** No differences in most or least preferred messages were found for groups with different driving exposure or different experience of Highway 401 driving.

**Order Effects:** Again, questionnaire order did not affect which messages were most or least preferred. The slight differences that did exist were in the expected direction, with messages being more preferred when they appeared first than when they appeared last.

QUESTION 6: TRAFFIC MOVING SLOWLY WITH OCCASIONAL STOPS
(Tables 6.0 - 6.3 and Figure 1):

**Overall Ranking:** The message "moderate congestion next 3 km" was most preferred (48.6%), followed by "speed 40-60 km/h next 3 km" (30.5%). As with Question 5 descriptors of travel time and delay time were noticeably less preferred than the other two messages.

**Age and Education Effects:** Most and least preferred messages were consistent across age groups and education levels, except that more of the drivers with public school education preferred the delay message the least..

**Exposure Effects:** Neither overall driving exposure nor 401 experience affected which messages were most or least preferred.

**Order Effects:** Questionnaire order had no effect on preference. As with Questions 4 and 5, slight differences that did exist were in the expected direction with messages being slightly more preferred when they appeared first rather than last.

QUESTION 7: TRAFFIC SLOW BUT KEEPS MOVING MESSAGES
(Tables 7.0 - 7.3 and Figure 1):

**Overall Ranking:** The most preferred message was "minor congestion next 3 km" (50.1%) with the speed message second most preferred (32.7%). Consistent with Questions 5 and 6, messages about travel time and delay time were noticeably less preferred than other messages.

**Age and Education Effects:** The most and least preferred messages were consistent across age groups and education levels.

**Exposure Effects:** Neither overall driving exposure nor 401 experience affected which messages were most or least preferred.

**Order Effects:** Order did not affect which were the two most preferred messages. However delay time and travel time were so close in ranking (9.5% and 7.8%, respectively) that the order of the questionnaire affected which of these received the lowest ranking. Where delay time appeared first, travel time received the lowest ranking and vice versa.

QUESTIONS 8, 9:

See 3.3.4/ Driver Responses to Diversionary and Advisory Messages

QUESTION 10: RUSH HOUR CONGESTION MESSAGES (Tables 10.0 - 10.3 and Figure 2):

**Overall Ranking:** The most preferred message by a very wide margin was "Rush hour conditions ahead next 5 km" (65.8%). "Normal congestion ahead next 5 km" was ranked next most preferred by 17.5%, time and weather messages by 11.3% and no message by 5.4%.

**Age and Education Effects:** Most and least preferred messages were consistent across age groups and education levels.

**Exposure Effects:** Neither overall driving exposure nor 401 experience affected which messages were most or least preferred.

**Order Effects:** Order did not affect which messages were most or least preferred. Difference between orders were very slight and in the expected direction.

QUESTION 11: FREE FLOWING TRAFFIC MESSAGES (Tables 11.0 - 11.3 and Figure 2):

**Overall Ranking:** The most preferred message was "normal traffic next 5 km" (47.9%) by a good margin. Messages giving directions available on nearby signs were next most preferred (25.7%) with no message, time and weather messages being least preferred (13.0 and 13.4% respectively). "No message" was ranked fourth by 60.1% of respondents.

**Age and Education Effects:** The two most preferred messages were ranked in the same order by all three education levels. The second most preferred message was affected by age group; the older the group the greater the preference for no message, than for messages giving directions available on nearby signs.

**Exposure Effects:** Neither overall driving exposure nor 401 experience affected which messages were most or least preferred.

**Order Effects:** Order did not affect which messages were most or least preferred.

### 3.3.4/ Driver Response to Diversionary and Advisory Messages

In Questions 8, 9 and 12, respondents were asked to imagine themselves driving on Highway 401 either in the express or collector lanes, traveling either all the way across Toronto or only a short distance. They were asked to indicate their response to various sign messages and were allowed to choose more than one response as long as the two responses chosen were not mutually exclusive (e.g., take the express lanes, exit the highway). Results are reported in terms of the percent of the total of 539 respondents selecting the response.

QUESTION 8: (Tables 8.0 - 8.3 and Figure 3):

Drivers were asked to imagine they were in the express lanes traveling across Toronto. Possible responses to the messages were: slow down immediately, change to the collector lanes at the next opportunity, and slow down when you see the traffic backup.

Messages in Question 8 mainly indicated conditions occurring close enough to the driver that traffic backups would be visible. In Question 9 messages indicated problems further ahead on the highway and respondents were told they could not see the problem. Respondents clearly differentiated between these two scenarios. In Question 8 respondents saying they would slow down immediately averaged 28.0% with the exceptions of the "icy conditions ahead" and "heavy congestion ahead, reduce speed" messages. In Question 9, as would be expected, this course of action was selected on average by a smaller percentage of drivers - 16.5%.

**Overall Effects:**
*Heavy vs Moderate Congestion Clears in 10 km* — Respondents differentiated between these two messages in that a greater percentage would slow down immediately and/or take the collector lanes at the next opportunity for the heavy congestion message (16% and 65.6%) than for the moderate congestion message (12% and 53.9%). More respondents said they would slow down when they saw the traffic backup for the moderate congestion message (46.2%) than for the heavy congestion message (35.1%).

*Heavy Congestion Clears in 3 km vs 10 km* — Fewer respondents would take the collector lanes at the next opportunity (43.9% vs 65.6%), and more would slow down when they saw the traffic backup (47.0% vs 35.1%) when the congestion lasted for 3 km compared to 10 km.

*Heavy Congestion Starts in 1 km. vs. Starts in 1 km Reduce Speed* — When the message explicitly said "reduce speed" more respondents noted that they would slow down immediately

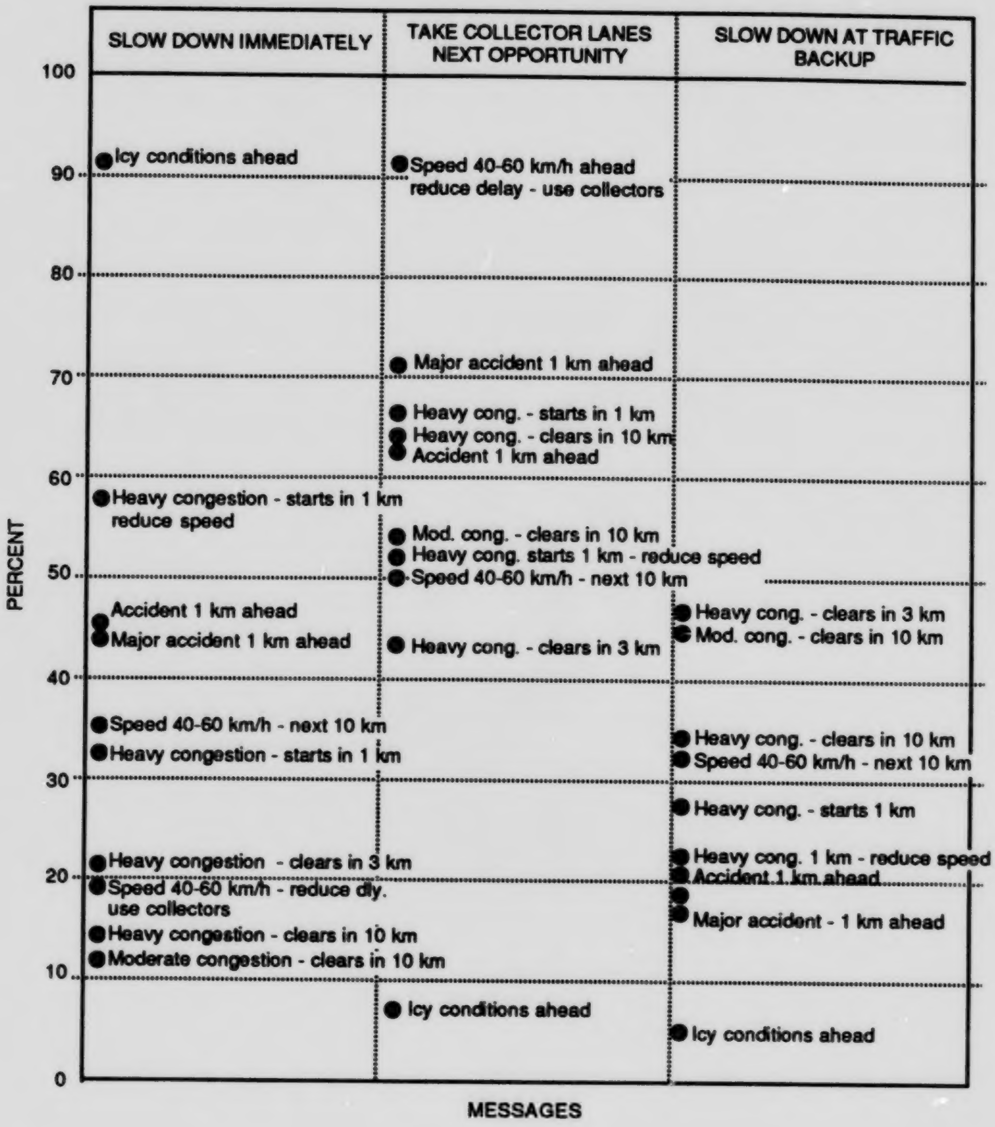

**Figure 3/ Question 8 – Percent of Drivers Choosing Given Actions for Messages**

(58.7% vs 33.6%) and fewer respondents said they would take the collectors at the next opportunity (52.8% vs 66.0%).

*Major Accident vs. Accident 1 km Ahead* — The descriptor "major" increased the number of respondents who would take the collector lanes (71.7% vs 63.2%).

*Speed 40-60 km/h Next 10 km vs Speed 40-60 km/h Ahead Reduce Delay Use Collector Lanes* When drivers were explicitly advised to take the collectors many more of them said they would do so (90.4% vs 50.5%) and fewer said they would slow down immediately or when they saw the traffic backup.

*Icy Conditions Ahead* — By far the most common response to this sign was to slow down immediately (90.5%). Less than 10% of the respondents said they would take the collectors or would slow down when they saw the traffic backup.

**Age Effects:** Older drivers were more likely than other drivers to say they would slow down immediately, rather than waiting until they saw the traffic backup, no matter what the message. Averaging responses over the ten messages, as age increased the tendency to respond "slow down immediately", increased systematically for each message (with 1 minor exception). For the younger drivers this was the response 29.9% of the time on average, for the middle age group, 39.1% of the time and for the older drivers 47.0% of the time. Conversely, the percent of drivers saying they would slow down when they saw the traffic backup (as opposed to immediately) decreased with increasing age. Also, on average, the younger the group, the more likely they responded that they would take the collector lanes (60.3% for the youngest, 46.0% for the oldest). These tendencies were particularly noticeable where the incident was indicated as being serious (e.g., heavy congestion clears in 10 km) or close by (e.g., major accident 1 km ahead). For three of the messages ("speed 40-60 km/h ahead next 10 km", "major accident 1 km ahead" and "accident 1 km ahead") more older drivers said they would slow down immediately than said they would take the collectors at the next opportunity. This was in contrast to the other two age groups.

**Education Effects:** Effects due to education level were minor. The most frequent responses were the same to all messages for each level with one exception. In response to "speed 40-60 km/h next 10 km" those with public school education were more likely to respond that they would slow down immediately and less likely to say they would take the collectors in comparison to other drivers. The former group did not differentiate between the messages "major accident" vs "accident 1 km ahead". The response was similar in both cases. In response to the message "heavy congestion starts in 1 km reduce speed" the public school group was half as likely as the other two groups to take the collector lanes. Again it must be emphasized that there were only 23 respondents in the public school group, making the interpretation somewhat speculative.

**Exposure Effects:** Experience of driving on the 401 had minor effects on the response to the various messages. For the message "speed 40-60 km/h next 10 km" the group who drove on the 401 least were equally likely to say they would slow down immediately or take the collectors, whereas for the other groups the most frequent response was to take the collector lanes. For the message "moderate congestion clears in 10 km" those who drove on the 401 least were more likely to say they would slow down when they saw the traffic backup whereas other groups were more likely to say they would take the collectors. Overall differences in responses between groups differing in experience on the 401 appeared to be minor.

Similarly, overall driving exposure had little effect on response to messages. For the message "moderate congestion clears in 10 km" the less experienced drivers were more likely to say they would slow down immediately (22.0% vs 10.3%) and less likely to say they would take the collectors (40.2% vs 56.1%), compared to the more experienced drivers.

**Order Effects:** Effects due to order were minor. When the message "heavy congestion ahead 1 km" appeared before "heavy congestion ahead 1 km reduce speed" proportionately more respondents were likely to say they would take the collector lanes compared to when the order of these messages was reversed. The most frequent responses to all messages were the same except for two minor exceptions, neither of which affected the comparisons between the messages.

QUESTION 9: (Tables 9.0 - 9.3 and Figure 4):

Drivers were asked to imagine they were in the express lanes traveling across Toronto. They were told they could not see the traffic problem ahead . Possible responses were the same as in Question 8.

**Overall Effects:**
*Heavy Congestion Starts in 3 km vs Heavy Congestion Ahead Reduce Delay Use Collector Lanes* — When drivers were explicitly advised to use the collectors more of them said they would do so compared to when this suggestion was not made (95.2% vs 76.4%).

*Heavy vs Moderate Congestion Ahead, Reduce Delay Use Collector Lanes* — Again, the advice to use the collector lanes resulted in a large majority of drivers saying they would do so, more for the heavy congestion message than for the moderate congestion message (95.2% vs 88.5%). More

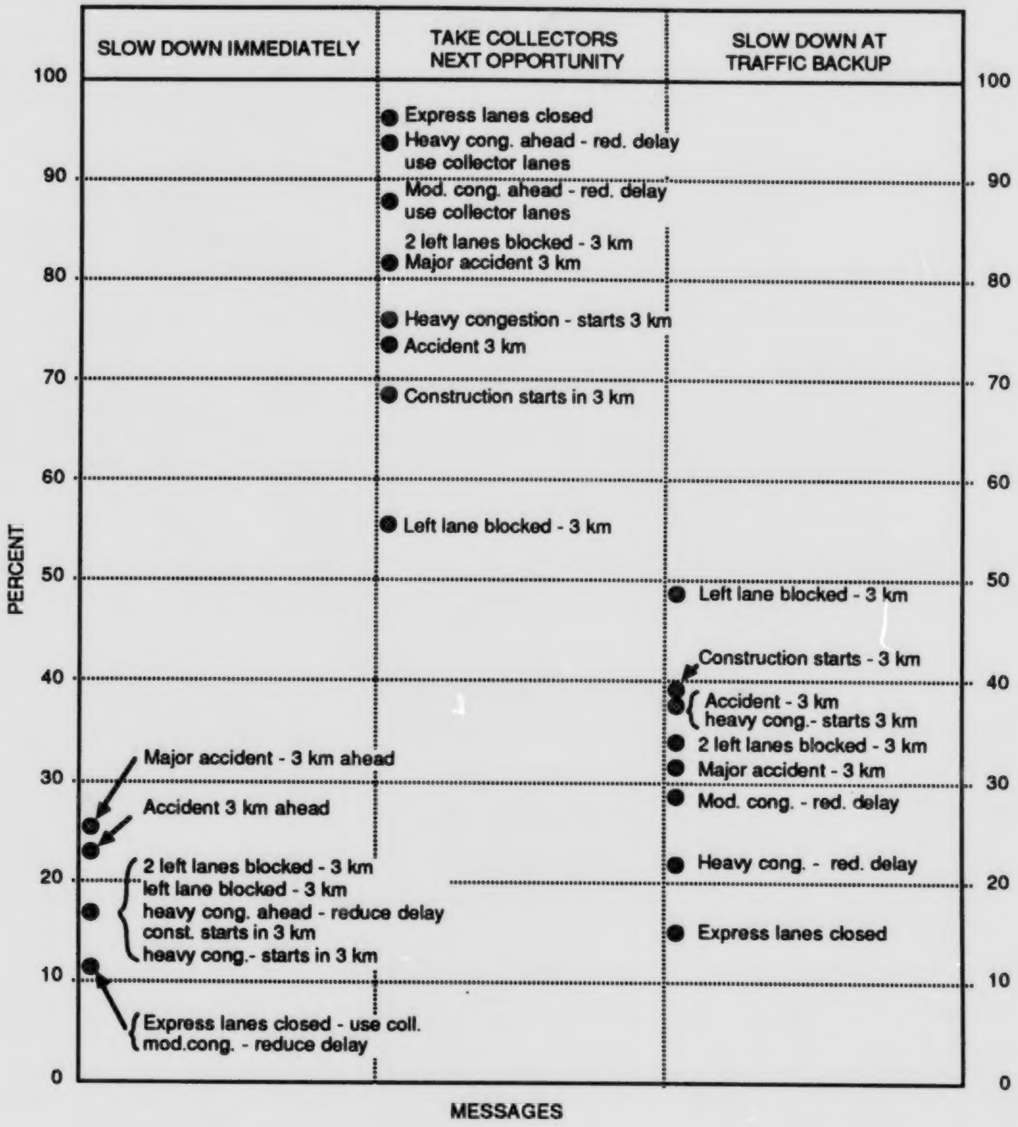

Figure 4/ Question 9 – Percent of Drivers Choosing Given Actions for Messages drivers said they would slow immediately for heavy congestion compared to moderate congestion (15.6% vs 10.0%).

*Major Accident vs Accident 3 km Ahead* — The descriptor "major" increased the number of respondents saying they would take the collectors and/or slow down immediately (80.5% vs 73.5%) and (25.8% vs 22.9%) respectively.

*2 Left Lanes Blocked vs Left Lane Blocked 3 km Ahead* — The message that two rather than one lane was blocked ahead influenced more respondents to take the collectors (80.7% vs 56.0%).

*Construction Starts in 3 km* — This message influenced the majority of drivers to say they would take the collector lanes (69%), suggesting that drivers perceive construction as creating serious traffic problems.

*Express Lanes Closed Ahead Use Collectors* — This message, not surprisingly, produced the largest number of drivers saying they would take the collector lanes (96.8%).

**Age Effects:** Effects on response due to age were minor. The effect of comparing the various messages (e.g., major accident vs accident 1 km ahead) was the same irrespective of age group. As was found for Question 8 there was a systematic tendency for more drivers to respond that they would slow immediately with increasing age (on average 11.7%, 17.5% and 23.8% for the young, middle and older age groups respectively).

**Education Effects:** The relative differentiation between messages was the same irrespective of education level. However there was a systematic tendency for people to say they would divert to the collector lanes as education level increased (on average: 71.5%, 78.0%, 82.4%).

**Exposure Effects:** Effects due to either experience of driving on Highway 401 or yearly driving exposure were minor. In the comparison of the two messages "major accident ahead" vs "accident ahead" the groups who drove the 401 daily but not in rush hour responded that they would slow down immediately more often for the accident message than for the major accident message. The difference was slight (15.4% vs 18.5%) and probably not significant.

**Order Effects:** Effects due to order of presentation of the messages were minor. For one message "left lane blocked 3 km ahead" the most common response differed depending on the order. However, in this case, two responses ("change to collectors" and "slow down when I see traffic backup") were chosen by similar numbers of respondents overall (56.0% and 48.4%), thus this order effect is considered minor.

QUESTION 12: (Tables 12.0 - 12.3 and Figures 5 and 6):

Respondents were asked to imagine they were traveling on Highway 401 in the collector lanes, planning to exit in 6 km which was 3 exits beyond where they saw the sign message. Possible responses were: slow down immediately, change to the express lanes, slow down when you see the traffic backup, and leave the highway at the next exit.

**Overall Effects:**
*Heavy vs Moderate vs Minor Congestion Clears in 10 km* — More than twice as many drivers said they would leave the highway at the next exit in response to the heavy congestion compared to the moderate congestion message (45.0% vs 20.2%). Drivers did not appear to differentiate at all between the moderate and minor descriptors with numbers of responses for each of the four possible actions being almost identical.

*Speed 20-40 km/h next 3 km vs next 10 km* — Respondents differentiated between these two conditions with more saying they would leave the highway at the next exit (34.5% vs 20.4%) or take the express lanes (24.7% vs 17.1%) when the congestion was for the next 10 as opposed to 3 km.

*Construction Starts in 1 km Reduce Speed* — The most common single response to this message was that drivers would slow down immediately (46.2%). About equal numbers said they would leave the collector lanes either by exiting the highway (25.8%) or by taking the express lanes (22.8%).

*Collectors Closed Ahead Through Traffic Use Express Lanes* — Approximately equal numbers of drivers responded that they would leave the highway at the next exit (44.2%) or take the express lanes (52.7%). Thus about 97% of drivers said they would leave the collector lanes in response to this message.

*Heavy Congestion Starts 1 km Ahead (QUESTION 8 VS QUESTION 12)* — This message allowed comparison between the scenario in Question 8 where respondents were to imagine they were in the express lanes traveling right across Toronto as opposed to the scenario in Question 12, traveling in the collector lanes planning to exit the highway within 6 km. In response to this

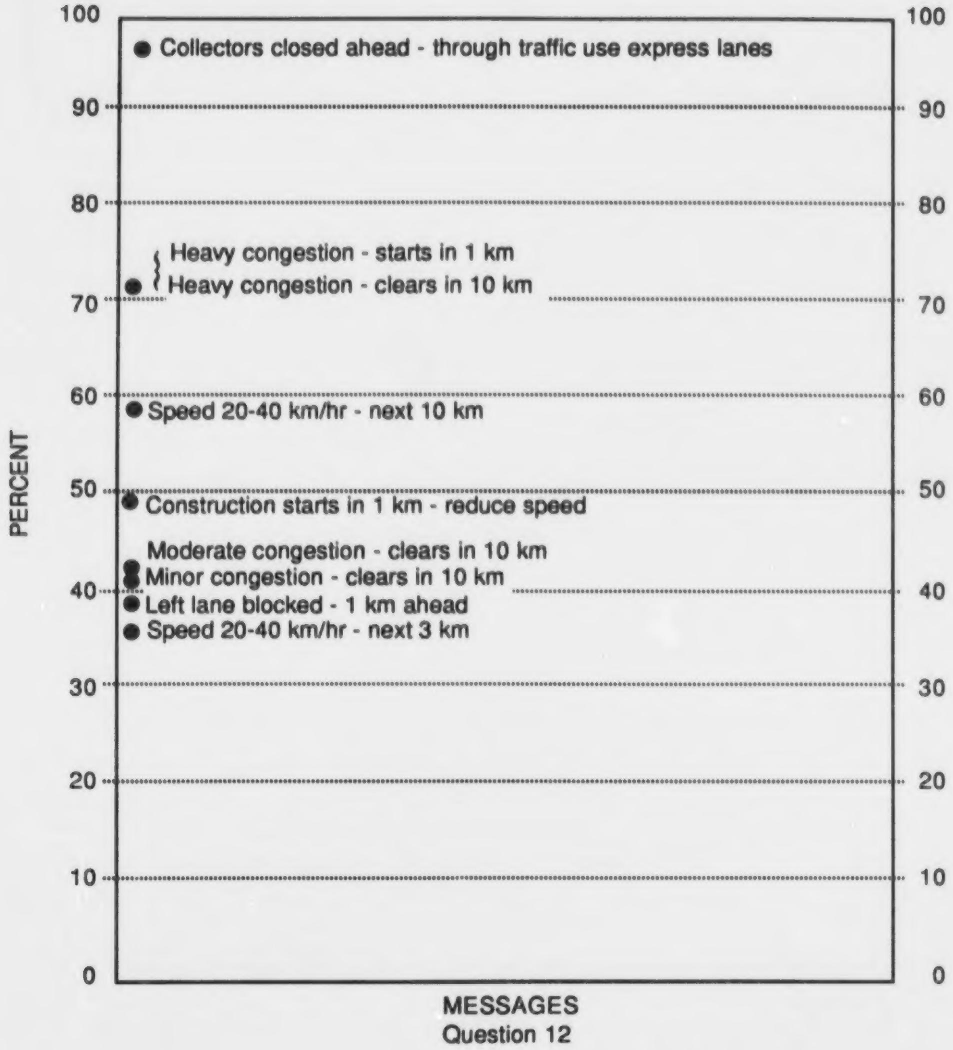

**Figure 5/ Percent of Total Drivers Diverting from Collector Lanes**
(Either Taking Express Lanes or Exiting the Highway)

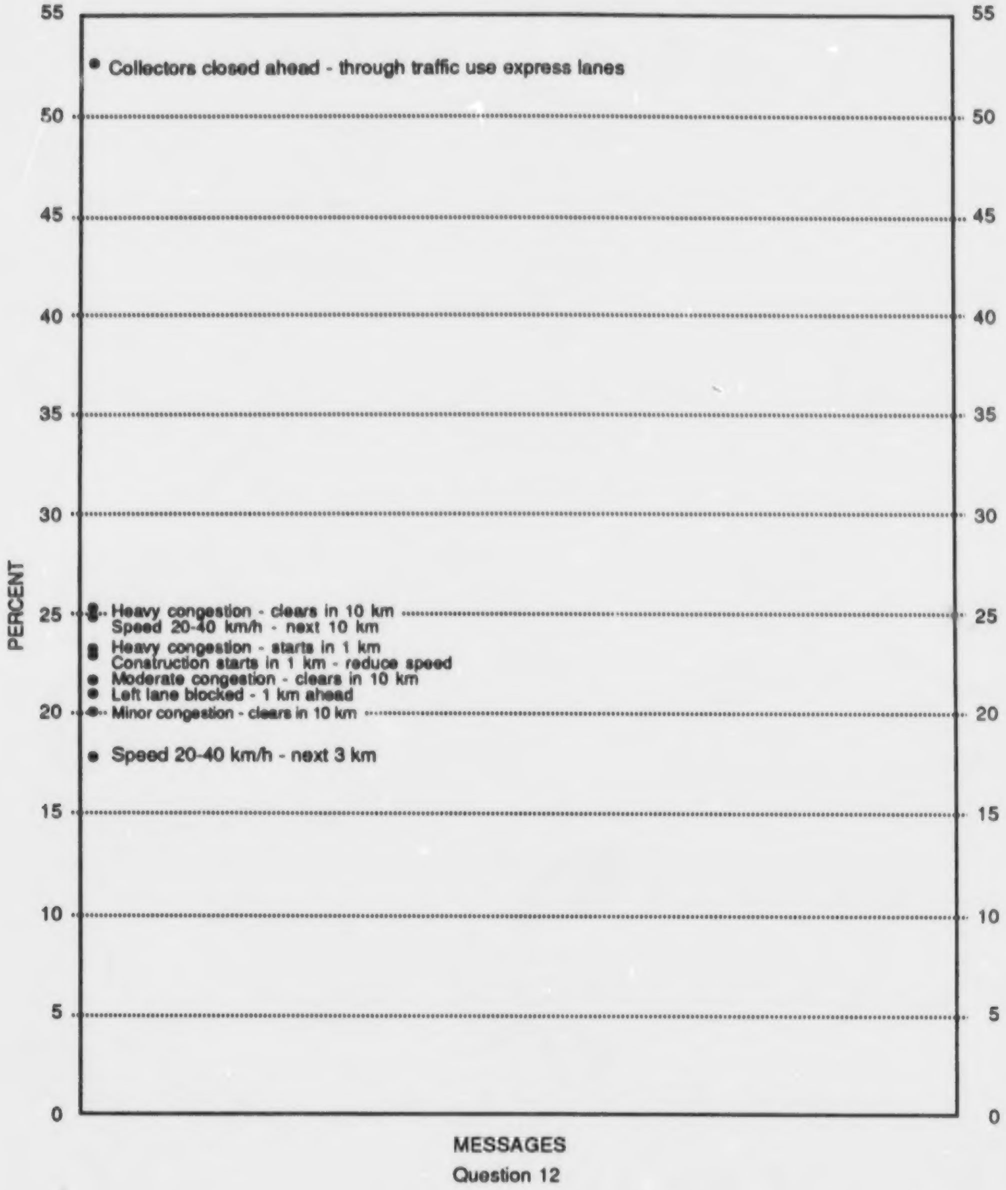

Figure 6/ Percent of Total Drivers Taking Express Lanes message, a greater percentage elected to divert when they were going to leave the highway shortly (71.5% vs 65.9%). This difference is small however.

**Age Effects:** In general, the older respondents were more likely to say they would slow down immediately (average for all nine messages: older 33.7%, middle 24.1%, younger 16.2%) rather than slow down when they see the traffic backup (older 29.3%, middle 39.4%, younger 38.8%). Older respondents were also less likely to divert (either to enter the express lanes or to leave the highway) compared to younger respondents; combined averages: older 47.2%, middle 55.4%, younger 60.7%.

**Education Effects:** Relative responses to messages were generally the same for each education group. However there was an increasing tendency for respondents to say they would slow down when they see the traffic backup as education level increased; and they would leave the highway at next exit as education level decreased.

**Exposure Effects:** The amount of 401 driving experience had few effects on results. Those who drove daily in rush hour were more likely (31.5%) than the other groups to change to the express lanes in response to the "heavy congestion clears in 10 km" message (31.5% vs 23.1%, 20.8% and 21.3%). However, this was not true for the message "speed 20-40 km/h next 10 km" which also indicates heavy congestion. In response to the message "collectors closed ahead through traffic use express lanes" a smaller percentage (91.1%) of the group with the least experience on the 401, (between once a month and once a week), indicated they would leave the collector lanes (91.1% vs 98.1%, 100% and 97.2%). Total yearly driving exposure did not appear to have any systematic effect on response to messages.

**Order Effects:** No systematic effects on response due to questionnaire order were noted.

### 3.3.5 / Driver Interpretation of Messages

Limitations in character size and reading time necessitate that CMS messages be brief, which may lead to ambiguity. Two questions examined the interpretation of two common messages.

QUESTION 13: (Tables 13.0 - 13.3):

*Speed 30-40 km/h next 3 km* — This message was interpreted mainly in one of two ways. Less than half of the respondents, 42.4%, thought it meant that the average speed of the traffic was between 30 and 40 km/h for the next 3 km. Almost as many, 38.7%, thought that it meant the recommended speed was 30 to 40 km/h for the next 3 km. Almost one fifth of respondents thought the message meant that the legal speed limit was 40 km/h for the next 3 km. Despite the wide variation in understanding of this message only 1.5% of respondents checked "don't know".

**Age and Education Effects:** Age group affected interpretation. The older groups differed from the other two in that a much higher percentage thought the sign meant that the legal speed limit was 40 km/h (42.3% vs 11.8% and 16.2% for the other two groups). The group with public school education was also more likely to make this interpretation than were the other two groups.

**Exposure Effects:** Experience driving on Highway 401 affected interpretation also. The least experienced group was less likely than the others to interpret the message as referring to the average speed (28.4% vs 44.8%, 50.8% and 43.4%) and more likely to interpret the message as referring to the recommended speed. The group with the lesser yearly driving exposure was also more likely to make this latter interpretation.

**Order Effects:** Questionnaire order did not noticeably affect response.

QUESTION 14: (Tables 14.0 - 14.3):

*Heavy Congestion next 3 km* — This message was interpreted by the majority of respondents (70.1%) to mean heavy congestion ended in 3 km. However, a sizable number (26.8%) interpreted this to mean that congestion started in 3 km. Only 3.2% of respondents indicated they didn't know the meaning of the message.

**Age, Exposure, Education and Order Effects:** Neither age nor 401 experience had a strong effect on interpretation of this message. Drivers with more driving exposure were more likely to think the sign meant congestion ends in 3 km (71.4%) than were less experienced drivers (62.2%). Conversely, those with public or high school education were less likely to interpret the sign this way than were respondents with post-secondary education (60.9%, 65.1% vs 77.1%). Questionnaire order did not have a noticeable effect on results.

### 3.3.6 / Comments from Respondents

At the end of the survey respondents were asked:

1) Is there anything else about changeable message signs you feel we should have asked about?
2) Do you have any other comments?

Replies appropriate to the first question were often given in answer to the second question and vice versa. Therefore replies were combined and are discussed below. Of 539 questionnaires, 241 had comments, indicating a high degree of interest in the survey.

The comments fell into eight categories:

- General comments on the concept of CMS
- Visibility of the signs
- Clarity of messages
- Information on signs
- Possibility of distraction
- Suggestions for improvement of Highway 401 or the highway system in general
- Comments on the questionnaire
- Other

Each of these categories will be addressed in turn.

**General Comments on the Concept of CMS:** Changeable message signs received a lot of unprompted support; 69 respondents said in various ways that CMS were a good idea. Additionally, considerable support was expressed for the existing signs on the QEW. It was felt that CMS would: alleviate congestion, aid the highway driver, and would be easier to see than static signs in bad weather. It was suggested that they be used especially after accidents, on all major routes, on all highways, and especially on the Don Valley Parkway and Highway 404. Questions were raised as to the colour of the signs, their frequency, how and by whom they would be operated or monitored to ensure accuracy, and whether they should be separate from regular signs. One person thought the results of the study should be made public.

Doubt about the concept was expressed by 18 respondents, both with regard to the cost (4) and whether or not taxpayers should be asked if they wanted such things implemented (5). There was concern that the displayed information might not be up-to-date (5). If the information was inaccurate it was felt that the CMS would be useless. Two people added here that it was annoying when the information on the signs on the QEW was found to be inaccurate. Two people only wanted to see the signs used for unusual conditions or when necessary, one person asked if weather conditions would affect the power input to the signs, and one if they would work.

Negative comments about the concept were expressed by 11 respondents. The need for minimal signage was expressed (5), it being suggested that those signs currently in operation were sufficient or that improvements should be made to these signs before the construction of new ones was considered. Some (3) saw CMS as a short term solution, the only real answer being an increase in road capacity. It was stated that CMS would not work because both the collector and express lanes are blocked during rush hour. Only one explicitly said he did not like the idea,and another said that it was not worth the investment.

**Visibility of Signs:** Comments on sign visibility were made by 9 respondents. People felt the signs should be large and visible from a distance, and that the colours should be visible under all light conditions (3). It was noted that the QEW signs were hard to read in bright sunlight (2) or when going west in the afternoon (1). To improve this it was recommended that the problems of glare at sunrise and sunset should be considered (1), and that the signs be kept clear in winter (2); one person suggested that all road signs should be constructed sloping forwards at a five degree angle to prevent snow settling on them.

**Clarity of Messages:** People thought the messages should be short, precise, clear, and unambiguous (12). They should not be changed too frequently (2), and a different colour should be used to help drivers distinguish them from ordinary signs (1). Concern was expressed over language problems (12), and it was inquired whether symbols might be used or international logos developed. One person suggested these should especially be used on the boundary between Ontario and Quebec.

It was also felt that drivers should be given an indication that the signs exist when they become operational so that they would know what to look out for. Consideration should perhaps even be given to training drivers to acknowledge them correctly (3).

**Information on Signs:** It was suggested that signs should warn drivers of bad road conditions, of restricted vision because of fog, or snow plows ahead (13). People (9) requested alternate route information on the signs, and information on whether these routes would likely be better. Information on traffic conditions elsewhere was asked for (5): i.e. on the express/collector lanes, on other freeways exiting Highway 401, on adjacent streets or even beyond Toronto. One person suggested that there should be a "highway full" sign 1 km before the entry ramp to give advance warning of the highway being blocked. Thirteen stated that reference to congestion should be made relative to upcoming exits. It was felt that the success of the whole project would rely on the placement of signs enough ahead of exits to allow people to act on the information without driving hazardously. There were 23 other suggestions about content of the signs and those of significance are included below.

Four people suggested that emergency messages be included, and one participant suggested that it would be useful to know if the situation was an emergency or not; 4 suggested only recommendations to drivers should be used, although one person opposed this and called only for advice on actual road conditions. Three suggested "have a nice day" messages when conditions were clear. Other suggested messages were "keep shoulder clear for emergency" message, an excessive speed message, driving tips when conditions were good, and the use of average speed as the only meaningful term.

**Distraction:** There was concern expressed about the possibility that the signs might be a distraction (19); but a third of these only expressed this concern with regard to the use of time or temperature messages (6). Another 4 felt there should not be any signs unrelated to traffic conditions, but 2 felt the signs should never be blank.

**Improvements to 401/ Highway System:** There were 42 comments in this category and the only repeated comments were that slow drivers should keep right (6), and that there should be no daytime construction (2). Also two people remarked on how badly marked the Jane St. and Black Creek Drive intersection is. Other comments were:

- Truck speeds should be limited to 90 km/h across the city.
- Trucks should reduce speed and use collector lanes during peak periods.
- Emergency services (phones) should be available every 15 km.
- Longer on-ramps to allow easier highway access.
- Better roadside signs to indicate narrowing or ending of lanes.
- Earlier warning of closed-off entry ramps.
- Flashing signs to make people slow down, like at the 400/401 intersection.
- Signs in the express lanes stating which exits can be accessed from a particular express/collector interchange.
- Information on exits following the one you are taking.
- During the rush hour or after accidents, people should be stopped from using the shoulders and then cutting you off.
- Signs do not clearly indicate one highway is changing into another.
- The 401 west collector interchange at Weston Road/Islington/409, and the express/collector interchange just before the Kennedy exit were both noted as dangerous.

**Comments on the Questionnaire: (21)** There were 4 unprompted positive comments with regard to the questionnaire; one offered congratulations to MTO for letting the driving public assist in traffic planning. Others suggested there should have been more questions about exiting the highway, questions on colour, examples of the most legible typeface, and a column for the interviewees to suggest answers to all questions. It was also remarked that decisions vary for the same sign because of time or weather conditions. One person suggested a more general question on whether or not CMS were desirable, one questioned if CMS might not bother drivers because they are telling them how to drive, and another thought there should be a survey to assess whether drivers think the signs on the QEW are successful.

**Other Comments: (19)** Most of these comments were not meaningful. The only significant ones were:

- There should be input on CMS design "from the professionals of the Driving Association of Ontario", Jack Beer, Director.
- Emergency vehicles should be part of the CMS set-up, informing people of fires or chemical spills ahead.
- Signs could be accessed by the OPP by means of computers along the roadway to give even more accurate details and in more specific language.
- Too many people use the highway.

There were also comments pertaining to the driver licensing offices.

# 4/ Non-English-Speakers Surveys

In addition to the main survey, two smaller surveys of Chinese-speaking and Italian-speaking drivers were carried out. The alternative questionnaires were translated into Chinese and into Italian with the exception, of course, of the traffic messages themselves, which remained in English. Questionnaires were given to 40 Italian-speaking and 40 Chinese-speaking respondents. Surveyors selected respondents mainly through personal contacts, within their own communities. Anyone who would have been capable of responding to the English version of the survey did not qualify as a participant. As in the main survey, participants had to qualify in terms of the type of vehicle they drive and the type of driving they did, and they were given a Wintario lottery ticket for their participation. Also, as in the main survey, half of the questionnaires contained one order of messages, and the other half, the reverse order of messages.

## 4.1/ Survey Results for Italian-Speaking Respondents

The 40 Italian-speaking respondents comprised a group who were 60% male and 40% female, 80% between the ages of 26 and 55, 10% younger, and 10% older drivers. Of the total, 40% had public school, 37.5% high school, and 22.5% post-secondary school education. Thus in contrast to the demographics of the main survey, this group had more female respondents (40% vs 27%), more public school respondents (40% vs 4.3%), and more middle age and fewer young drivers (80% vs 62% for middle age and 10% vs 28% for young). Demographic information is shown on Table 15 in Appendix B4. Results of the survey, including percentage of respondents not understanding each message are shown on an English form of the questionnaire in Appendix B4, Table 16.

### 4.1.1/ Interviewer Portion of the Questionnaire

As was the case in the main survey, most respondents drove cars (80%) rather than trucks. Fewer Italian-speaking respondents drove more than 10,000 km per year, and fewer drove daily on Highway 401 compared to the main survey (65% vs 84.6% and 30% vs 51.4%, respectively). Compared to the main survey, an even greater majority of Italian speakers answered questions 4 through 8 correctly, indicating they understood how the express/collector lane system worked.

### 4.1.2/ Understanding of the English Messages

When respondents did not understand the content of an English message they were asked to mark it with an "x". In the majority of cases none or only one of the participants did not understand any given message.

### 4.1.3/ Driver Preference for Descriptors

QUESTIONS 1, 2: Congestion Messages:

For the messages about heavy congestion and moderate congestion, Italian speakers ranked messages in exactly the same order and with close to the same proportion as was found in the main survey. As in the main survey, the words "heavy congestion" and "traffic slowdown" were most preferred, to describe traffic that was moving very slowly and traffic that was moving somewhat slowly, respectively.

### 4.1.4/ Driver Preference for Advance Warning of Delays

QUESTION 3:

The most frequent preference of Italian speakers was for information to be given 6 to 8 km in advance, while the main survey preference was for 4 to 5 km in advance.

### 4.1.5/ Driver Preference for Type of Information

QUESTION 4: Major Accident Messages:

Italian-speaking respondents expressed approximately equal preference for "major accident ahead 1 km before Avenue Road" and "major accident ahead left 2 lanes blocked", in line with the results of the main survey. Both surveys found the same ranking for the other two messages.

QUESTION 5: Stop and Go Traffic Messages:

The most preferred message for stop and go traffic for the Italian-speaking respondents was "heavy congestion next 3 km". This message, as well as the other three were ranked the same way, and approximately in the same proportion, as were the messages in the main survey.

QUESTION 6: Traffic Moving Slowly with Occasional Stops Messages:

As in the main survey, the most preferred message was "moderate congestion next 3 km", but the two least preferred messages were ranked in the reverse order in the Italian speakers survey.

QUESTION 7: Traffic Slow But Keeps Moving Messages:

Italian-speaking respondents showed equal preference for the messages "speed 60-80 km/h next 3 km" and "minor congestion next 3 km" whereas respondents in the main survey had shown a somewhat greater preference for the latter. The two least preferred messages were ranked similarly in each survey.

QUESTION 10: Typical Rush Hour Congestion Messages:

As was the case in the main survey, the most preferred message by a very wide margin was "rush hour conditions ahead next 5 km". Though time and weather messages were ranked in third place in the main survey (11.3%), none of the Italian-speaking respondents chose this option.

QUESTION 11: Free Flowing Traffic Messages:

As in the main survey, the most preferred message was "normal traffic next 5 km". A minor difference between the surveys was that the order of the two least preferred messages was interchanged.

### 4.1.6 Driver Response to Diversionary and Advisory Messages

QUESTION 8:

With one major exception the pattern of response to the messages in Question 8 was the same for the Italian speakers as was found in the main survey. This exception was that for every one of the 10 messages, a smaller percentage of Italian speaking drivers responded that they would slow down immediately and a larger percentage responded that they would slow down when they saw the traffic backup. This tendency resulted in the most frequent response to the message "heavy congestion starts in 1 km reduce speed" being to take the collectors as opposed to slowing down immediately as was the case in the main survey.

This finding is not explained by the demographics of the two surveys. The main survey had a greater proportion of younger drivers and a smaller proportion of women, compared to the Italian speakers survey, both factors that would lead one to expect a smaller proportion in the main survey preferring to slow down immediately compared to the Italian speakers survey. However, the reverse was found.

QUESTION 9:

The pattern of responses was similar for the Italian-speakers survey and the main survey. Two slight differences were noted. In terms of taking the collectors, Italian-speaking respondents did not distinguish between the messages "heavy vs moderate congestion ahead, reduce delay use collector lanes". An equally high percentage, 82.5% said they would take the collectors in each case, whereas in the main survey the percentages taking the collectors differed by a small amount: 95.2% - heavy, 88.5% - moderate. A second difference in response was to the messages "major accident vs accident, 3 km ahead". Fewer of the Italian-speaking respondents said they would take the collectors in response to the first message (72.5%) than in response to the second (75%) whereas, in the main survey, the reverse was the case. The differences however are small, considering the size of the Italian speakers survey, and probably are insignificant.

As was found in response to Question 8, there was less of a tendency (8 out of 9 messages) for Italian-speaking respondents to say they would slow immediately and more of a tendency to say they would slow down when they saw the traffic backup (7 out of 9 messages) compared to main survey respondents.

QUESTION 12:

With one exception the most frequent response to each message in the Italian-speakers survey was the same as that in the main survey. The exception was the message "construction starts in 1 km - reduce speed". The most frequent response by the Italian speakers to this was that they would leave the highway at the next exit (52.5%) whereas in the main survey the most frequent response was to slow down immediately (46.2%). In terms of comparing messages, Italian-speaking respondents differentiated between messages in the same way respondents did in the main survey. As was true in responses to Questions 8 and 9, Italian speakers were less likely to say they would slow down immediately and more likely to say they would divert (in this case "leave highway at next exit", "change to express lanes").

### 4.1.7/ Driver Interpretation of Messages

QUESTIONS 13, 14:

Interpretation of the message "speed 30-40 km/h next 3 km" was similar for the Italian speakers survey and the main survey except that slightly more Italian speakers interpreted this message as referring to the recommended speed as compared to the average speed (42.5% vs 40.0%) whereas for the main survey the reverse had been the case (38.7% vs 42.4%). However, the differences are slight and unlikely to be significant.

Interpretation of the message "heavy congestion next 3 km" was ranked the same for the Italian speakers survey and the main survey except that the percentage of Italian speakers who thought the message meant congestion starts in 3 km was rather higher, (40.0%), than in the main survey (26.8%).

### 4.1.8/ Summary

The results of the Italian speakers survey are very close to those obtained from the main survey. Drivers appeared to understand the English messages with little trouble. One reason for this is that the Italian equivalent for words such as "congestion" and "accident" are very similar to the English. The only consistent difference between the two surveys was the greater tendency of the Italian speaking respondents to say they would slow down when they saw the traffic backup, rather than immediately. However, with only one exception, the preferred responses to the messages were the same for both surveys.

## 4.2/ Survey Results for Chinese-Speaking Respondents

The 40 Chinese respondents comprised a group who were 70% male and 30% female, 72.5% between the ages of 26 and 55, 12.5% younger, and 15% older. Of the total, 25% had public school, 65% had high school and 10% post-secondary school education. In contrast to the demographics of the main survey, this group had a smaller proportion of younger drivers (12.5% vs 28.2%) and more middle age and older drivers (72.5% vs 62.0%, middle and 15% vs 9.8%, older) as well as more respondents with public school education (25.0% vs 4.3%) and fewer with post-secondary school education (10.0% vs 42.9%). Survey demographics are shown in Table 17 in Appendix B4. Results of the survey, including percentage of respondents not understanding each message are shown on an English form of the questionnaire in Appendix B4, Table 18.

### 4.2.1/ Interviewer Portion of the Questionnaire

As in the other two surveys the majority of respondents mainly drove cars, rather than trucks. Fewer Chinese-speaking respondents drove more than 10,000 km per year, and fewer drove daily on Highway 401 compared to the main survey (70% vs 84.6% and 42.5% vs 51.4%, respectively). Compared to the main survey, a smaller majority of Chinese speakers understood how the express/collector lane system worked. For each of Questions 4 through 8, there were more incorrect and "don't know" answers compared to the main survey.

### 4.2.2/ Understanding of the English Messages

In contrast to the Italian speakers survey, many Chinese speakers had difficulty understanding the English messages. On average, about one third of the respondents did not understand any given message. Messages containing the word "congestion", in particular, were not understood by about half of the participants. As will become clear in the following sections, this lack of understanding strongly influenced driver preferences.

### 4.2.3/ Driver Preference for Descriptors

QUESTIONS 1, 2: Congestion Messages:

For describing traffic which was moving very slowly, respondents most preferred "traffic jam starts in 1 km" which was also the best understood message. Only 37.5% indicated they did not understand this message in contrast to 52.2% for the message with the words "heavy congestion". The message most preferred by the Chinese speakers was the least preferred message in the main survey.

For describing traffic which was moving somewhat slowly, respondents most preferred "traffic delay starts in 1 km". Again, this message was best understood by the Chinese speaking participants, but least preferred by the main survey respondents.

### 4.2.4 Driver Preference for Advance Warning of Delays

QUESTION 3:

The last four options, ranging from 2-3 km up to more than 8 km, were equally preferred by the Chinese-speaking respondents (22.5%), the first option was least preferred. The main survey respondents expressed the most preference for the third option, 4 to 5 km (32.7%).

### 4.2.5 Driver Preference for Type of Information

QUESTION 4: Major Accident Messages:

In describing a major accident, Chinese-speaking respondents most preferred the message "major accident ahead 20 minute delay". This was the least preferred message in the main survey. The second most preferred message by the Chinese-speaking respondents used the term "congestion" and was the least understood message; it was the third preference in the main survey.

QUESTION 5: Heavy Congestion Messages:

To describe stop and go traffic the most preferred message was "speed 20-40 km/h next 3 km"; it was the second preference in the main survey. Of the four messages this message was the best understood by the Chinese-speaking respondents — only 10% (4) indicated they did not understand it. The next most preferred message was "delay 3 to 7 min next 3 km", the third preference in the main study. The "heavy congestion" description, which was most preferred in the main survey, was not understood by 50% of Chinese-speaking respondents and was the third most preferred.

QUESTION 6: Moderate Congestion Messages:

Again the most preferred messages were speed and delay descriptors with the speed message best understood; the least understood was the message using the term "congestion" which was most preferred in the main survey.

QUESTION 7: Minor Congestion Messages:

Results were consistent with those from Questions 5 and 6, the speed and delay descriptors being most preferred and the congestion descriptor being least understood, the latter being most preferred in the main survey.

QUESTION 10: Rush Hour Congestion Messages:

For the first time, the Chinese-speaking respondents expressed the same preference as respondents in the main survey. The message "rush hour conditions ahead next 5 km" shared first preference with time and weather messages. However the strength of the preference was much less pronounced in the Chinese speakers survey. Least preference was expressed for the message about congestion, again one of the least understood messages, and for the no message condition.

QUESTION 11: Normal Traffic Messages:

For normal traffic, Chinese-speaking respondents most preferred no message, the least preferred option in the main survey. The message most preferred in the main survey, "normal traffic next 5 km" was second preference in the Chinese-speakers survey, but was not understood by 45% of respondents.

### 4.2.6 Driver Response to Diversionary and Advisory Messages

QUESTION 8:

Although the ten messages were not understood by 12.5% to 57.5% of the Chinese speaking-respondents, comparisons between messages yielded much the same pattern of responses in the Chinese survey as in the main survey. For example, participants differentiated between "heavy vs moderate congestion, clears in 10 km" in the same way as in the main survey, with more respondents saying they would take the collectors at the first opportunity for the heavy congestion message. Other message comparisons were also consistent in both surveys. In examining the most preferred response to individual messages, however, for half of the messages the most preferred response differed from the main survey. For the two messages about speed, the two messages about accidents, and the message "moderate congestion clears in 10 km", Chinese-speaking respondents were more likely to say they would slow down either immediately or when the traffic backed up, while respondents in the main survey were more likely to say they would take the collector lanes at the first opportunity.

Messages which used the term "congestion" were not understood by half or more of the respondents. Messages using the words "accident" and "icy conditions" were not understood by about one third of the respondents.

QUESTION 9:

Comparisons between messages yielded much the same pattern of responses in the Chinese speakers survey as in the main survey, with one exception. Chinese-speaking respondents did not differentiate at all between the messages "left lane blocked vs 2 left lanes blocked, 3 km ahead", while in the main survey noticeably more respondents said they would take the collectors in response to the second message. As was the case for Question 8, the most preferred response differed for 5 of the 9 messages from the response in the main survey. For the messages about blocked lanes, and about accidents and the message about construction ahead, Chinese-speaking respondents were more likely to say they would slow down either immediately or when the traffic backed up, while respondents in the main survey were more likely to take the collector lanes.

Again, messages with the word "congestion" were not understood by about half the respondents. Messages using the words "accident" and "left lane blocked" were not understood by about one third and one quarter of the respondents, respectively. The message "express lanes closed ahead use collector lanes" was not understood by one third of respondents.

QUESTION 12:

Comparisons between messages yielded a pattern of responses in the Chinese speakers survey more similar to the main survey than occurred in Questions 8 and 9; the most preferred response differed for three messages, specifically the two messages using the phrase "speed 20-40 km/h ahead" and the message "collectors closed ahead, through traffic use express lanes". Once again, Chinese-speaking respondents were much more likely to say they would slow down immediately in response to the speed messages, than were the main survey respondents. In response to the collectors closed message, they were more likely to say they would leave the highway, whereas main survey respondents would have changed to the express lanes.

As in the responses to Questions 8 and 9, messages using the word "congestion" were not understood by about half of the respondents. The message about the collector lanes being closed was not understood by over one third of the respondents. Only one tenth of the respondents did not understand the messages about speed.

### 4.2.7 Driver Interpretation of Messages

QUESTIONS 13, 14:

Half the Chinese-speaking respondents felt that the message "speed 30-40 km/h next 3 km" referred to a recommended speed. Only 10% of respondents thought the message referred to the average speed of the traffic. This is in contrast to the main survey where the latter was the most frequent interpretation (42.4%).

The message "heavy congestion next 3 km" was also interpreted differently by the Chinese-speaking respondents. The most frequent response was "don't know" followed by "heavy congestion starts in 3 km" (32.5%) and "heavy congestion ends in 3 km" (22.5%). In the main survey the latter interpretation was the most preferred (70.1%).

### 4.2.8 Summary

As might be expected from the major differences between written English and written Chinese, English messages were not understood by anywhere from 10-50% of respondents. This lack of understanding certainly affected preference, in many cases greatest preference being shown for messages which the majority understood. The pattern of responses to messages was similar to the main survey in terms of comparisons between messages. However examining the messages individually, in about one half of the cases, Chinese-speaking respondents were less likely to divert and more likely to slow down than were respondents in the main survey.

# 5/ Discussion and Conclusions

## 5.1/ Driver Preference for Descriptors

Results showed that the most preferred term for stop and go traffic overall was "heavy congestion"; for slowly moving traffic with occasional stops, "traffic slowdown" was preferred. "Traffic jam" and "traffic delay" respectively, were the least preferred descriptors of these conditions. With one exception, age, sex, exposure, education and questionnaire order did not affect these findings. The exception was that the older group showed a slightly greater preference for the term "severe traffic delay" to describe heavy congestion. These findings cannot be directly compared to other research since this particular question does not seem to have been dealt with before. One study however, did show that older drivers and drivers with less than grade 8 education preferred messages about expected speed rather than the message "heavy congestion". It was thought that this term might not have been well understood and therefore less preferred (Heathington et al, 1970).

## 5.2/ Driver Preference for Advance Warning of Delay

Equal numbers of drivers preferred to be warned "2 to 3 km" in advance or "4 to 5 km" in advance of traffic problems. This result was consistent with the pilot survey results and not significantly affected by age, sex, education, exposure or questionnaire order.

## 5.3/ Driver Preference for Type of Information

There were three messages about a major accident which were ranked very closely: "2 left lanes blocked", "1 km before Avenue Rd." and "congestion for 5 km". A message about delay time was clearly not preferred. These findings are consistent with studies by Heathington et al (1970) and Dudek et al (1971). They are also consistent with the study by Hulbert and Beers (1971) who found drivers first preference was for information on lane blockage (if any). In contrast to this study, however, Hulbert and Beers' subjects rated location of the incident to be of least preference. This may have been because their subjects used a simulator with messages referring to an imaginary roadway whereas subjects in this study were considering an actual roadway with which they were reasonably familiar.

The most preferred message about stop and go traffic was "heavy congestion next 3 km", about traffic moving slowly with occasional stops, "moderate congestion next 3 km" and about traffic which was slow but kept moving, "minor congestion next 3 km". The preference for these descriptors was noticeably greater than the preference for speed, delay, or travel time descriptors. The findings for the stop and go traffic are consistent with Heathington and his colleagues who found the message "accident-heavy congestion ahead" was most preferred, but not consistent with their findings about moderate congestion. For this condition their subjects preferred speed information, which was second preference in this study.

To describe rush hour congestion, respondents clearly preferred "rush hour conditions ahead next 5 km", and to describe normal free flowing traffic, "normal traffic next 5 km". Messages not relating to the traffic condition, that is time and weather messages, messages giving directions on nearby static signs and no message, were clearly less preferred by the majority of respondents. This result is consistent with studies which have shown drivers prefer to have real-time information about traffic conditions even when traffic was normal, (Heathington et al, 1970; Dudek et al, 1971; Hulbert and Beers, 1971). It should be noted that where no message is presented, drivers cannot tell whether the lack of message is due to sign malfunction or for normal traffic. Similarly, repeating messages displayed on nearby static signs may indicate either the detection system is not functioning and the default is being used, or traffic is normal. Time and weather messages clearly are in real-time and indicate the sign is functioning but are still less preferred by a wide margin than real-time information about the traffic condition.

Differences in preference for the various descriptors because of age, education, exposure or questionnaire order were of little consequence. The messages most preferred in the main survey were consistent with those most preferred in the pilot survey.

## 5.4/ Driver Response to Sign Messages

Figures 3 and 4 show the sign messages in Questions 8 and 9 on a graph indicating the relative percent of respondents who would divert to the collector lanes. As expected the greatest diversion (97%) occurs with the message "express lanes closed ahead use collectors lanes". Diversion very close to this level is associated with the message "heavy congestion" "speed 40 - 60 km/h ahead" and "moderate congestion" when combined with advice to use the collector lanes. Messages about a major accident or 2 left lanes blocked, produced almost equal and the next highest diversion rate.

Diversion was high for messages indicating heavy congestion that started close by (1 or 3 km) or lasted for a long distance (10 km). There was less diversion for short sections of heavy congestion (3 km) than for long sections of moderate congestion (10 km). Interestingly a message about construction ahead produced as much diversion as the message "heavy congestion clears in 10 km" indicating drivers perceive construction as being very disruptive to traffic. Thus messages referring to construction should not be used unless major disruption is in fact likely to result from the construction itself.

Figures 5 and 6 graph responses to messages in Question 12. In Question 12 respondents were asked to imagine themselves traveling a short distance on the collectors with options including diverting, either to the express lanes or to an exit of the highway. As expected the highest diversion occurred for the message "collectors closed ahead - through traffic use express lanes." Next highest diversion occurred for messages indicating heavy congestion which lasted a long time. Though "speed 20-40 km/h" suggests very slow traffic, much less diversion occurred for messages using this phrase than occurred when the phrase "heavy congestion" was used, except for diversion to the express lanes in response to "speed 20-40 km/h, next 10 km". Respondents overall appeared to interpret the traffic problem described by "speed 20-40 km/h" as half-way between heavy and moderate congestion. As would be expected more respondents said they would divert by exiting the highway than by taking the express lanes when the traffic problem was indicated as being serious (e.g., "heavy congestion clears in 10 km").

Exposure, education and questionnaire order had minor or no effects on response to messages. Age group had a clearly systematic but small effect. The older respondents were more likely to "slow down immediately". However, the most frequent response to each message was consistent across the various age groups for six of the nine messages.

## 5.5/ Driver Interpretation of Sign Messages

Two questions were asked to determine driver's interpretation of two phrases frequently used on changeable message signs, "speed 30-40 km/h next 3 km" and "heavy congestion next 3 km". A slight majority of the respondents thought the speed message referred to the average traffic speed, which is what this message is usually intended to convey. However, almost as many thought the message referred to a recommended speed and almost one fifth thought it referred to the legal speed limit (42% of respondents over the age of 55 thought it referred to the legal speed limit). The second message was correctly interpreted by the majority of respondents, but about one quarter thought it meant that congestion started, rather than ended, in 3 km.

## 5.6/ General Comments

Two aspects of the survey are problematic. First the number of respondents with public school education was so low (23) that results for this group are unreliable. Heathington et al (1970) reported that in his survey, drivers with public school education had different preferences, specifically they did not choose a message with the word "congestion" in it as first preference. Though conclusions are speculative because of the small numbers involved, a similar result was found in this study. Though females were also under-represented in the current survey compared to males, this is less of a concern for the following reason. Even though the sample was not completely representative in terms of the male/female ratio, a large proportion of the sample was female, enough to adequately determine if there were differences in response between males and females. The few differences found were only minor and felt to be of no consequence.

The second troubling aspect of the survey, is that respondents indicated they much preferred the term "traffic slowdown" for describing moderate congestion. Unfortunately all of the messages describing moderate congestion used the phrase "moderate congestion" rather than "traffic slowdown".

A number of findings from the surveys suggest particular areas where the public should be educated about CMS before they become operational. In particular if people are expected to divert to the collector or express lanes they should be made aware of the parallel nature of these roadways, and the fact that the speed limit is the same on both. The interpretation of commonly used sign messages should be made clear, particularly signs indicating average traffic speeds. This is important to avoid drivers thinking the speed refers to a legal speed limit and therefore slowing down abruptly.

The large differences in preference between the main survey and the Chinese speakers survey because of lack of understanding of the messages suggests specialised publicity is needed to educate the various language groups in Metropolitan Toronto with respect to key words to be used on the signs.

As noted in the beginning of the Results section no statistical analysis was performed. Differences in preference due to age, education, driving exposure and questionnaire order are in most cases small and probably statistically insignificant but consideration should be given to verifying this statistically, possibly using simple CHI-square tests. Though there may in fact be some real differences in preference due to age or education or exposure there is not much consequence from a practical point of view; other than to design for maximising the most appropriate response.

Driver comments were interesting and informative. It should be gratifying to MTO that so many respondents, unasked, said changeable message signs (CMS) were a good idea. Comments which were of particular interest were:

1) CMS would not work because both the collector and express lanes are blocked during rush hour.

2) The QEW changeable message signs were hard to read in bright sunlight or when going west at sunset.

3) The signs should be kept clear in winter.

4) Drivers should be informed when the signs become operational so they know what to look for.

5) The signs should contain alternate route information.

6) Drivers should receive earlier warning of closed-off entry ramps.

7) There should be signs in the express lanes stating which exits can be accessed from a particular express/collector interchange. (This comment is of interest in that there already are signs over the express lanes advising drivers of up-coming express/collector interchanges and the corresponding exits that can the be accessed from the collector lanes).

In conclusion, this survey has provided useful information about driver preference for types of information, the distance at which advance information is given as well as driver interpretation of two commonly used messages. Where comparisons could be made with the literature, results from the questionnaire were quite consistent with earlier work.

In terms of driver response it must be emphasized that the findings of the survey cannot be used to predict **absolute** diversion rates for different messages. Drivers actually on the highway may respond differently. Drivers will certainly change their responses during the introduction of the changeable message sign system as they learn the traffic patterns associated with the various messages. The findings of this survey can, however, be used to predict **relative** diversion. It is clear for example that drivers do not differentiate between the terms "moderate" and "minor" congestion. They do respond differently to different lengths of congestion. They are more likely to take an action when explicitly told to do so, for example, to take the collectors when a message about heavy congestion is combined with this advice, or to reduce speed when so instructed.

It must also be emphasised that while this survey provides some basis for developing CMS messages to be used on Highway 401 it does not answer all the important questions. Other issues which need to be settled when the first candidate messages are generated are:

- Can the messages be read quickly?
- Are all abbreviations commonly understood?
- Are all the messages comprehended by drivers, particularly those with less than high school education?

Once the CMS system comes into operation a full field study will be necessary to determine whether the signs are having the desired effect. Combining this field study with driver-completed questionnaires or interviews would provide the opportunity for feedback from drivers. Drivers' perception of system reliability is of particular importance if real traffic control is to be attained.

## 6/ References

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# APPENDIX A1

## Pilot Survey — Interviewer Portion of Questionnaire

# INTERVIEWER PORTION OF QUESTIONNAIRE

We are conducting a survey for the Ontario Ministry of Transportation and Communications about how to make traffic flow more smoothly on Highway 401 in Toronto. The questionnaire can be completed in about 15 minutes while you are waiting for your license to be processed. (If you are eligible, we can give you $4 worth of Wintario tickets for your participation.) Would you be interested in participating?

1. How often do you drive on the 401?

    1) daily in rush hour
    2) daily but not in rush hour
    3) more than once a week but not daily
    4) between once a month and once a week
    5) between once a year and once a month
    6) never or less than once a year

IF EXPOSURE IS IN CATEGORIES 5) OR 6) THE INTERVIEW WILL END HERE.

2. About how many kilometers do you drive a year? If you share a car with someone we would like to know how many kilometers you yourself drive.

    1) more than 10,000 km (6200 miles) per year.
    2) less than 10,000 km (6200 miles) per year.

I'm going to ask you a few questions about driving on the express and collector lanes on Highway 401.

3. When can you change from express to collector lanes?

    1) whenever you want to
    2) only at certain points along the road
    3) never
    4) don't know

(IF THE PARTICIPANT INDICATES THAT THEY DO NOT UNDERSTAND THE MEANING OF EXPRESS AND COLLECTOR, THIS WILL BE NOTED. THEY WILL BE ASKED TO ANSWER AS BEST THEY CAN (THE QUESTIONS THEMSELVES MAY HELP THEM SORT OUT THE DIFFERENCE).)

4. When can you change from collector to express lanes?

    1) whenever you want to
    2) only at certain points along the road
    3) never
    4) don't know

5. Can you enter express lanes directly from a ramp off a city street?

   1) yes
   2) no
   3) don't know

6. Can you enter the collector lanes directly from a ramp off a city street?

   1) yes
   2) no
   3) don't know

7. Is the speed limit the same on the collector and express lanes?

   1) yes
   2) no
   3) don't know

8. If you were traveling in the collector lanes, could you continue across Toronto without changing to the express lanes?

   1) yes
   2) no
   3) don't know

9. If you were traveling in the express lanes, could you continue across Toronto without changing to the collector lanes?

   1) yes
   2) no
   3) don't know

Could you now take this questionnaire and check off your answers to the questions in the spaces indicated. Please give it back to me before you leave.

IF RESPONDENTS INDICATE CONFUSION ABOUT THE EXPRESS OR COLLECTOR LANES THE INTERVIEWER WILL EXPLAIN THE SYSTEM USING THE DIAGRAM AT THE BEGINNING OF THE QUESTIONNAIRE.

# APPENDIX A2

## Ministry Letter Given to Participants

Ontario

Ministry of
Transportation and
Communications

Human and Social Factors Office
Strategic Policy Secretariat
1201 Wilson Avenue
East Building
Downsview, Ontario
M3M 1J8

Dear Driver,

This ministry is developing new signs with changeable messages for directing traffic on the 401 in Toronto. We need your help to know the type of traffic information you, the driver, prefer.

Please take the time to complete the questionnaire as the information you provide will be used to improve traffic conditions on Highway 401, especially at times of accidents, construction and heavy traffic.

Your response will be kept confidential, and you do not need to put your name on the questionnaire. The firm we have hired to interview you is Human Factors North.

If you have any questions, please contact Chris Blamey from this office at 235-4445.

We appreciate your assistance and cooperation.

Eileen Simon

E. Simon
Manager

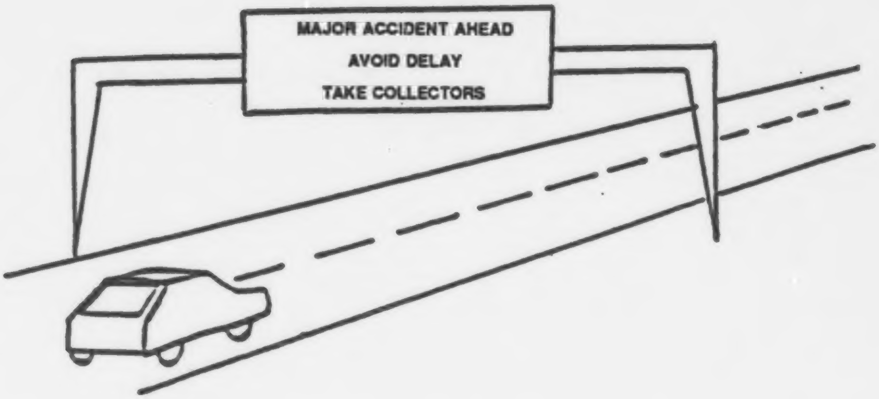
# APPENDIX A3

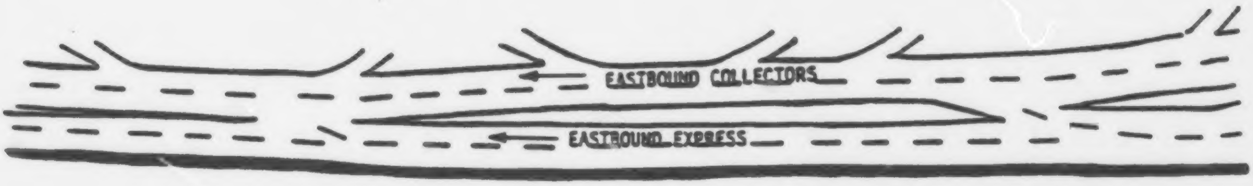
## Pilot Survey — Questionnaire and Results

# INTRODUCTION

The Ontario Ministry of Transportation is going to put up changeable message signs on Highway 401 to warn drivers of problems such as accidents or lanes being blocked (See first figure below). In this questionnaire you will be asked what kind of information you would like to have about a traffic problem ahead and what you would do if you saw particular sign messages. Please answer all the questions. Your answers will be used to help in deciding what information to put on the changeable message signs to make traffic flow more smoothly and safely.

The section of Highway 401 that goes through Toronto has two separate roadways going in each direction. The lanes on the inside roadway, nearest the opposing traffic, are referred to as the "EXPRESS" lanes, and those on the outside of the roadway, furthest from the opposing traffic, are referred to as the "COLLECTOR" lanes. At certain points you can transfer back and forth between the express and collector lanes. (See second figure below.)





WESTBOUND COLLECTOR AND EXPRESS LANES

N.B. Results are shown in numbers of respondents out of a total of 38.

## PILOT SURVEY
## QUESTIONNAIRE AND RESULTS

Please check appropriate box

Sex: Male 29
Female 9

Age: 16-25 10
26-55 24
over 55 3

Level of Education:

Grade 1-8 0
Grade 9-13 9
University or Post Secondary 29

For all the following questions please imagine you are traveling on Highway 401 and you see a sign above the roadway with a message on it.

1. Imagine there is a major accident ahead of you before your intended exit. You can't see either the accident or the traffic backup just before it. Which of the following traffic sign messages about the accident would you prefer to have? Rank these messages in order of your preference, with 1 for most preferred, 2 for next most preferred, etc. up to 6 for least preferred. Even though 2 of the choices seem equally preferable to you, please decide between them and do not give them the same ranking. Include "no message" in your ranking.

MAJOR ACCIDENT AHEAD
1 KM BEFORE AVENUE ROAD 17

MAJOR ACCIDENT AHEAD
SPEED 20-40 KM/H 1

MAJOR ACCIDENT AHEAD
20 MINUTE DELAY 3

MAJOR ACCIDENT AHEAD
LEFT 2 LANES BLOCKED 13

MAJOR ACCIDENT AHEAD
CONGESTION FOR 5 KM 2

NO MESSAGE (blank sign) 0

2. The traffic is very congested (stop and go) ahead of you. Rank the following traffic sign messages in order of your preference, with 1 for most preferred, 2 for next most preferred, etc, up to 5 for least preferred. Please do not give any 2 messages the same rank.

DELAY 3 TO 7 MIN. 9
NEXT 3 KM.

SPEED 20-40 KM/H. 6
NEXT 3 KM.

HEAVY CONGESTION 12
NEXT 3 KM.

TRAVEL TIME 4-9 MIN. 10
NEXT 3 KM.

NO MESSAGE (blank sign) 1

Your suggested message if
none of the above is
preferred. ________________

3. The traffic is somewhat congested (slow moving with occasional stops) ahead of you. Rank the following traffic sign messages in order of your preference, with 1 for most preferred, 2 for next most preferred, etc. up to 5 for least preferred. Please do not give any 2 messages the same rank.

DELAY 1 TO 3 MIN. 7
NEXT 3 KM.

SPEED 40-60 KM/H. 8
NEXT 3 KM.

MODERATE CONGESTION 17
NEXT 3 KM.

TRAVEL TIME 3-4 MIN. 5
NEXT 3 KM.

NO MESSAGE (blank sign) 1

4. Traffic is slightly congested (slow but keeps moving). Rank the following traffic sign messages in order of your preference, with 1 for most preferred, 2 for next most preferred, etc. up to 5 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| MINOR CONGESTION<br>NEXT 3 KM | 16 |
| DELAY UP TO 1 MIN<br>NEXT 3 KM | 4 |
| SPEED 60-80 KM/H<br>NEXT 3 KM | 10 |
| TRAVEL TIME 2-3 MIN<br>NEXT 3 KM | 5 |
| NO MESSAGE (blank sign) | 3 |

5. You are travelling on Highway 401 in rush hour. Traffic in the area you are traveling through is congested in the same way it usually is in rush hour. Rank the following traffic sign messages in order of your preference, with 1 for most preferred, 2 for next most preferred, etc. up to 7 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| NORMAL CONGESTION AHEAD<br>NEXT 5 KM | 9 |
| NORMAL RUSH HOUR<br>CONDITIONS AHEAD<br>NEXT 5 KM | 16 |
| TRAFFIC CONDITIONS NORMAL<br>NEXT 5 KM | 4 |
| NO MESSAGE (blank sign) | 5 |
| message giving directions<br>which are also given on nearby signs<br>(eg. AVENUE ROAD EXIT 1 KM) | 2 |
| safety messages<br>(eg. WEAR YOUR SEATBELT) | 0 |
| time and/or weather messages<br>(eg TIME 4:31 - CLOUDY) | 2 |

6. You are traveling on Highway 401. Traffic is flowing freely. Rank the following traffic sign messages in order of your preference, with 1 for most preferred, 2 for next most preferred, etc. up to 6 for least preferred. Please do not give any 2 messages the same rank.

NORMAL TRAFFIC 12
NEXT 5 KM

TRAFFIC OK 7
NEXT 5 KM

no message (blank sign) 7

Messages giving directions 5
which are also given on nearby signs
(eg AVENUE ROAD EXIT 1 KM)

Safety messages 1
(eg WEAR YOUR SEATBELT)

time and/or weather messages
(eg TIME 4:31 - CLOUDY) 6

7. You are traveling on Highway 401 in the EXPRESS lanes. You are in a hurry. You are planning to travel all the way across Toronto. You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a check mark (√) to indicate only one action for each message, even though more than one might be possible.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY | CHANGE TO COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP |
|---|---|---|---|
| MAJOR ACCIDENT<br>1 KM AHEAD. | 12 | 25 | 1 |
| MODERATE CONGESTION<br>CLEARS IN 10 KM | 3 | 18 | 17 |
| SPEED 40-60 KM/H<br>NEXT 10 KM | 7 | 17 | 14 |
| HEAVY CONGESTION<br>CLEARS IN 3 KM | 2 | 20 | 16 |
| HEAVY CONGESTION<br>CLEARS IN 10 KM | 2 | 31 | 4 |
| ACCIDENT<br>1 KM AHEAD | 9 | 23 | 6 |
| HEAVY CONGESTION<br>STARTS IN 1 KM | 2 | 32 | 4 |
| HEAVY CONGESTION<br>STARTS IN 1 KM<br>REDUCE SPEED | 18 | 16 | 3 |
| HEAVY CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 3 | 35 | 0 |
| MODERATE CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 2 | 34 | 2 |
| HEAVY CONGESTION<br>STARTS IN 3 KM | 2 | 29 | 7 |
| SPEED 40-60 KM/H AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 5 | 31 | 2 |

8. You are traveling on Highway 401 in the EXPRESS lanes. You are NOT in a hurry. You are planning to travel right across Toronto. You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a checkmark (√) to indicate only one action for each message, even though more than one might be possible.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY | TAKE COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP |
|---|---|---|---|
| ACCIDENT<br>3 KM AHEAD | 4 | 21 | 13 |
| LEFT LANE BLOCKED<br>3 KM AHEAD | 1 | 19 | 18 |
| HEAVY CONGESTION<br>CLEARS IN 10 KM | 0 | 30 | 7 |
| MAJOR ACCIDENT<br>3 KM AHEAD | 4 | 30 | 3 |
| HEAVY CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 0 | 36 | 2 |
| 2 LEFT LANES BLOCKED<br>3 KM AHEAD | 1 | 30 | 7 |
| EXPRESS LANES CLOSED<br>USE COLLECTOR LANES | 0 | 37 | 1 |
| MODERATE CONGESTION<br>CLEARS IN 10 KM | 1 | 20 | 17 |
| SLIPPERY PAVEMENT CONDITIONS<br>REDUCE SPEED | 31 | 1 | 6 |

9. You are traveling on Highway 401 in the COLLECTOR lanes. You are in a hurry. You are planning to exit the highway in 6 km, which is 3 exits beyond where you are now. You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a checkmark (√) to indicate only one action for each message, even though more than one might be possible.

| YOUR MESSAGE IN THE COLLECTOR LANES | SLOW DOWN IMMEDIATELY | LEAVE HIGHWAY AT NEXT EXIT | SLOW DOWN WHEN I SEE TRAFFIC BACKUP | CHANGE TO EXPRESS LANES |
|---|---|---|---|---|
| ICY CONDITIONS AHEAD REDUCE SPEED | 29 | 3 | 5 | 0 |
| MODERATE CONGESTION CLEARS IN 10 KM | 1 | 5 | 23 | 8 |
| SPEED 20-40 KM/H NEXT 3 KM | 8 | 2 | 18 | 9 |
| SPEED 20-40 KM/H NEXT 10 KM | 5 | 5 | 14 | 13 |
| 2 LEFT LANES BLOCKED 1 KM AHEAD | 0 | 14 | 9 | 14 |
| HEAVY CONGESTION STARTS IN 1 KM | 1 | 18 | 5 | 13 |
| CONSTRUCTION STARTS IN 1 KM REDUCE SPEED | 11 | 5 | 12 | 9 |
| HEAVY CONGESTION CLEARS IN 10 KM | 0 | 15 | 7 | 15 |
| LEFT LANE BLOCKED 1 KM AHEAD | 3 | 5 | 16 | 11 |
| COLLECTORS CLOSED AHEAD THROUGH TRAFFIC USE EXPRESS LANES | 0 | 11 | 2 | 23 |
| MINOR CONGESTION CLEARS IN 10 KM | 2 | 4 | 23 | 7 |
| CONSTRUCTION STARTS IN 1 KM | 2 | 9 | 14 | 11 |

10. How far in advance of the start of unusual congestion do you think information about the delay should be given to drivers?

less than 2 km. (about 1 mile) 2

2 to 3 km. (about 1-2 miles) 16

4 to 5 km. (about 2 1/2 to 3 miles) 9

6 to 7 km. (about 4 - 4 1/2 miles) 4

more than 7 km (more than 4 1/2 miles) 6

11. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving very slowly (stop and go). Please rank the following traffic sign messages in order of preference, with 1 for most preferable, 2 for next preferable, etc., to 4 for least preferable.

HEAVY CONGESTION
STARTS IN 1 KM 16

SEVERE TRAFFIC BACKUP
STARTS IN 1 KM 4

SEVERE TRAFFIC DELAY
STARTS IN 1 KM 7

TRAFFIC JAM
STARTS IN 1 KM 10

12. Which of the following traffic sign messages do you think is best to indicate that the traffic ahead on the highway is moving somewhat slowly (slow moving with occasional stops). Please rank the following traffic sign messages in order of preference, with 1 for most preferable, 2 for next preferable, etc., and 3 for least preferable.

MODERATE CONGESTION
STARTS IN 1 KM 15

TRAFFIC BACKUP
STARTS IN 1 KM 4

TRAFFIC DELAY
STARTS IN 1 KM 6

TRAFFIC SLOWDOWN
STARTS IN 1 KM 12

13. What does this sign message mean to you? Please circle your answer.

SPEED 30 KM/H
NEXT 3 KM

1. The legal speed limit is 30 km/h for the next 3 km. ________ 14
2. The average speed of the traffic is 30 km/h for the next 3 km. ________ 9
3. The recommended speed is 30 km/h for the next 3 km. ________ 11
4. Don't know ________ 2

14. What does this sign message mean to you? Please circle your answer.

HEAVY CONGESTION
NEXT 3 KM

1. Heavy congestion starts in 3 km. ________ 4
2. Heavy congestion ends in 3 km. ________ 31
3. Don't know. ________ 1

15. When you drive on the 401 do you prefer driving on...

1. The collector lanes. ________ 2
2. The express lanes. ________ 11
3. Either depending on the situation. ________ 23

Please circle your answer.

WHEN THE QUESTIONNAIRE IS HANDED IN THE INTERVIEWER WILL CHECK THAT IT IS COMPLETED.

# APPENDIX A4

## Pilot Survey — Debriefing Form

# PILOT SURVEY
# DEBRIEFING FORM

Participant No. ________

Paid ________ Not Paid ________

Confusion about Express and Collector lanes

Yes ________ No ________

1. Was the length of the questionnaire OK or was it too long or too short?

________________________________________

2. Were any of the questions too wordy or too long? If so, which ones?

________________________________________

3. Did you feel any of the questions were too similar to another question? If so, which ones?

________________________________________

4. Was the questionnaire easy to understand or was it confusing? If so, were any questions particularly confusing?

________________________________________

5. Were there any questions you had difficulty answering because of the words that were used? If so, which ones.

________________________________________

6. Is there anything else about changeable message signs you feel we should have asked about?

________________________________________

7. Did you mind taking the time to do this questionnaire?

________________________________________

8. Was the use of kilometers rather than miles a problem for you?

________________________________________

IF PAID

9a. Do you think people would be willing to do this questionnaire for free?

Yes ________ No ________ Maybe ________

IF NOT PAID

9b. Do you think people should be paid to fill in this questionnaire?

Yes _______ No _______ Maybe _______ Don't know _______

If so, how much?

$ _______

10. Do you have any other comments?

_______________________________________

# APPENDIX B1

## Main Survey — Interview Results and Data Collection Sheet

# INTERVIEWER PORTION OF QUESTIONNAIRE

We are conducting a survey for the Ontario Ministry of Transportation and Communications about how to make traffic flow more smoothly on Highway 401 in Toronto. The questionnaire can be completed in about 15 minutes while you are waiting for your license to be processed. If you are eligible, we can give you a Wintario ticket for your participation. Would you be interested in participating?

1. What kind of motor vehicle do you mainly drive?

| | |
|---|---|
| 1) car | 84.8% |
| 2) truck or van | 15.2% |
| 3) motorcycle | |

IF MOTORCYCLE THE INTERVIEW WILL END HERE

2. How often do you drive on the 401?

| | |
|---|---|
| 1) daily in rush hour | 39.3% |
| 2) daily but not in rush hour | 12.1% |
| 3) more than once a week but not daily | 32.0% |
| 4) between once a month and once a week | 16.5% |
| 5) between once a year and once a month | |
| 6) never or less than once a year | |

IF EXPOSURE IS IN CATEGORIES 5) OR 6) THE INTERVIEW WILL END HERE.

3. About how many kilometers (miles) do you drive a year? If you share a vehicle with someone we would like to know the distance you yourself drive.

| | |
|---|---|
| 1) more than 10,000 km (6200 miles) per year. | 84.6% |
| 2) less than 10,000 km (6200 miles) per year. | 15.4% |

I'm going to ask you a few questions about driving on the express and collector lanes on Highway 401.

4. When can you change from express to collector lanes?

| | |
|---|---|
| 1) whenever you want to | 10.6% |
| 2) only at certain points along the road | 86.3% |
| 3) never | 0.9% |
| 4) don't know | 2.2% |

(IF THE PARTICIPANT INDICATES THAT THEY DO NOT UNDERSTAND THE MEANING OF EXPRESS AND COLLECTOR, THIS WILL BE NOTED. THEY WILL BE ASKED TO ANSWER AS BEST THEY CAN (THE QUESTIONS THEMSELVES MAY HELP THEM SORT OUT THE DIFFERENCE).)

5. Can you enter express lanes directly from a ramp off a city street?

| | |
|---|---|
| 1) yes | 13.9% |
| 2) no | 83.5% |
| 3) don't know | 2.6% |

6. Can you enter the collector lanes directly from a ramp off a city street?

| | |
|---|---|
| 1) yes | 89.8% |
| 2) no | 7.4% |
| 3) don't know | 2.8% |

7. Is the speed limit the same on the collector and express lanes?

| | |
|---|---|
| 1) yes | 79.2% |
| 2) no | 14.3% |
| 3) don't know | 6.5% |

8. If you were travelling in the collector lanes, could you continue across Toronto without changing to the express lanes?

| | |
|---|---|
| 1) yes | 70.9% |
| 2) no | 20.8% |
| 3) don't know | 8.3% |

9. If you heard a traffic report that there was congestion on the 401 what would that mean? ______________________________

Could you now take this questionnaire and fill it in. Your responses will be kept confidential. Please do not put your name on the questionnaire. Please give it back to me before you leave.

Confusion About Express/Collector No ____
Yes ____

IF RESPONDENTS INDICATE CONFUSION ABOUT THE EXPRESS OR COLLECTOR LANES THE INTERVIEWER WILL EXPLAIN THE SYSTEM USING THE DIAGRAM AT THE BEGINNING OF THE QUESTIONNAIRE.

# DATA COLLECTION SHEET

## Interview Portion of Questionnnaire

(Quest type 2)

Participant No. ______ Date ______ Location ______

| | | |
|---|---|---|
| 1-2 | 1. | _ |
| 1-4 | 2. | _ |
| 1-2 | 3. | _ |
| 1-4 | 4. | _ |
| 1-3 | 5. | _ |
| 1-3 | 6. | _ |
| 1-3 | 7. | _ |
| 1-3 | 8. | _ |

Confusion about Exp/Coll ______
No = 0
Yes = 1

## QUESTIONNAIRE

| | | | |
|---|---|---|---|
| M=1, F=2 | 1-2 | Sex | __ |
| 16-25=1, 26-55=2, >55=3 | 1-3 | Age | __ |
| Pub Sch=12, High Sch=2, Univ=3 | 1-3 | Education | __ |
| Order of choices | 1-3 | 1. | _ _ _ |
| Order of choices | 1-3 | 2. | _ _ _ |
| 1=<25km, 5=>7km | 1-5 | 3. | _ |
| Order of choices | 1-4 | 4. | _ _ _ _ |
| Order of choices | 1-4 | 5. | _ _ _ _ |
| Order of choices | 1-4 | 6. | _ _ _ _ |
| Order of choices | 1-4 | 7. | _ _ _ _ |
| | | | S H H H M H A M I S |
| Slow immed.=1, Coll=2, Slow backup=3 | 1-3 | 8. | _ _ _ _ _ _ _ _ _ _ |
| | | | E L 2 C H M M H A |
| Slow immed.=1, Coll=2, Slow backup.=3, | 1-3 | 9. | _ _ _ _ _ _ _ _ _ |
| Order of choices | 1-4 | 10. | _ _ _ _ |
| Order of choices | 1-4 | 11. | _ _ _ _ |
| | | | M C L H C H S S M |
| Slow immed.=1, Exit=2, Slow backup.=3, Express=4 | 1-4 | 12. | _ _ _ _ _ _ _ _ _ |
| | 1-4 | 13. | _ |
| | 1-3 | 14. | _ |

# APPENDIX B2

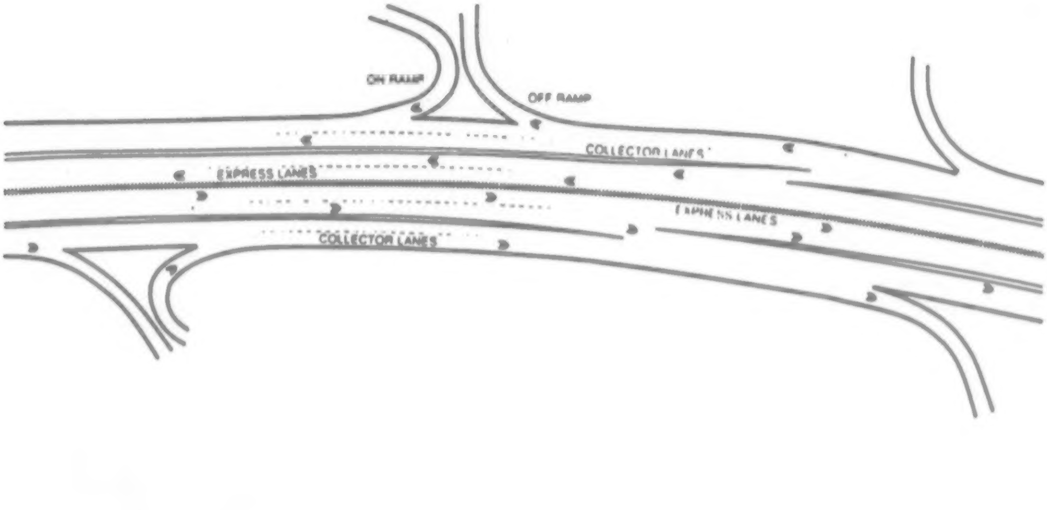
## Main Survey — Questionnaire and Results

## INTRODUCTION

The Ontario Ministry of Transportation and Communications is going to put up changeable message signs on Highway 401 in the Toronto area to warn drivers of problems such as accidents or lanes being blocked. We need your help in deciding which sign messages should be used. In this questionnaire you will be asked what kind of information you would like to have about a traffic problem ahead of you and what you would do if you saw particular messages. Please answer all the questions.

## HOW THE EXPRESS AND COLLECTOR LANES WORK

The section of Highway 401 that goes through Toronto has two separate roadways going in each direction. The lanes on the innner roadway, nearest the opposing traffic, are referred to as the "EXPRESS" lanes, and those on the outer roadway, furthest from the opposing traffic, are referred to as the "COLLECTOR" lanes. At certain points you can transfer between the express and collector lanes.



N.B. Results are reported as a percent of 539 respondents.

## QUESTIONNAIRE

Please check appropriate space

| | |
|---|---|
| Sex: Male | 405 |
| Female | 134 |

| | |
|---|---|
| Age: 16-25 | 152 |
| 26-55 | 334 |
| over 55 | 53 |

| | |
|---|---|
| Level of Education: Grade 1-8 | 23 |
| Grade 9-13 | 285 |
| University or Post Secondary | 231 |

FOR ALL THE FOLLOWING QUESTIONS PLEASE IMAGINE YOU ARE TRAVELLING ON HIGHWAY 401 AND YOU SEE A SIGN ABOVE THE ROADWAY WITH A MESSAGE ON IT.

1. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving very slowly (stop and go). Please rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, down to 3 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

| | |
|---|---|
| SEVERE TRAFFIC DELAY STARTS IN 1 KM | 31.7% |
| HEAVY CONGESTION STARTS IN 1 KM | 45.6% |
| TRAFFIC JAM STARTS IN 1 KM | 22.6% |

2. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving somewhat slowly (slow moving with occasional stops). Please rank the following traffic sign messages, with 1 for most preferred, 2 for next most preferred, and 3 for least preferred.

| | |
|---|---|
| MODERATE CONGESTION STARTS IN 1 KM | 26.9% |
| TRAFFIC DELAY STARTS IN 1 KM | 22.6% |
| TRAFFIC SLOWDOWN STARTS IN 1 KM | 50.5% |

3. How far in advance of the start of unusual congestion do you think information about the delay should be given to drivers?
Please circle the number of your answer.

| | | |
|---|---|---|
| 1. | less than 2 km. (about 1 mile) | 10.2 % |
| 2. | 2 to 3 km. (about 1-2 miles) | 34.9 % |
| 3. | 4 to 5 km. (about 2 1/2 to 3 miles) | 32.7% |
| 4. | 6 to 8 km. (about 4 - 5 miles) | 13.8% |
| 5. | more than 8 km (more than 5 miles) | 8.4% |

4. Imagine there is a MAJOR ACCIDENT ahead.

Which of the messages below would you prefer? Rank these messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

| | |
|---|---|
| MAJOR ACCIDENT AHEAD<br>1 KM BEFORE AVENUE ROAD | 30.4 % |
| MAJOR ACCIDENT AHEAD<br>20 MINUTE DELAY | 8.0 % |
| MAJOR ACCIDENT AHEAD<br>LEFT 2 LANES BLOCKED | 36.0 % |
| MAJOR ACCIDENT AHEAD<br>CONGESTION FOR 5 KM | 25.6 % |

5. The traffic is STOP AND GO ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc, down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| DELAY 3 TO 7 MIN. NEXT 3 KM. | 15.0 % |
| SPEED 20-40 KM/H. NEXT 3 KM. | 29.5 % |
| HEAVY CONGESTION NEXT 3 KM. | 47.5 % |
| TRAVEL TIME 5-9 MIN. NEXT 3 KM. | 8.0 % |

6. The traffic is MOVING SLOWLY WITH OCCASIONAL STOPS ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| DELAY 1 TO 3 MIN. NEXT 3 KM. | 13.7 % |
| SPEED 40-60 KM/H. NEXT 3 KM. | 30.4 % |
| MODERATE CONGESTION NEXT 3 KM. | 48.6 % |
| TRAVEL TIME 3-5 MIN. NEXT 3 KM. | 7.2 % |

7. Traffic is SLOW BUT KEEPS MOVING. Rank the following traffic sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| DELAY UP TO 1 MIN NEXT 3 KM | 9.5 % |
| SPEED 60-80 KM/H NEXT 3 KM | 32.7 % |
| MINOR CONGESTION NEXT 3 KM | 50.1 % |
| TRAVEL TIME 2-3 MIN NEXT 3 KM | 7.8 % |

8. You are travelling on Highway 401 in the EXPRESS lanes.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY % | TAKE COLLECTOR LANES AT NEXT OPPORTUNITY % | SLOW DOWN WHEN I SEE TRAFFIC BACKUP % |
|---|---|---|---|
| SPEED 40-60 KM/H NEXT 10 KM | 34.5 | 50.5 | 33.6 |
| ICY CONDITIONS AHEAD | 90.5 | 7.6 | 5.9 |
| MODERATE CONGESTION CLEARS IN 10 KM | 12.1 | 53.8 | 46.2 |
| ACCIDENT 1 KM AHEAD | 45.1 | 63.1 | 20.6 |
| HEAVY CONGESTION CLEARS IN 3 KM | 20.2 | 43.8 | 46.9 |
| MAJOR ACCIDENT 1 KM AHEAD | 43.2 | 71.6 | 17.3 |
| HEAVY CONGESTION STARTS IN 1 KM | 33.6 | 65.9 | 28.6 |
| HEAVY CONGESTION STARTS IN 1 KM REDUCE SPEED | 58.6 | 52.7 | 21.2 |
| HEAVY CONGESTION CLEARS IN 10 KM | 16.0 | 65.5 | 35.1 |
| SPEED 40-60 KM/H AHEAD REDUCE DELAY USE COLLECTOR LANES | 19.1 | 90.4 | 18.4 |

9. You are travelling on Highway 401 in the EXPRESS lanes.
You CAN'T SEE any traffic problem ahead.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Use a checkmark (√) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY | CHANGE TO COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP |
|---|---|---|---|
| | % | % | % |
| ACCIDENT<br>3 KM AHEAD | 22.8 | 73.5 | 38.6 |
| HEAVY CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 15.6 | 95.2 | 21.7 |
| MAJOR ACCIDENT<br>3 KM AHEAD. | 25.8 | 80.5 | 31.5 |
| MODERATE CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 10.0 | 88.5 | 29.1 |
| HEAVY CONGESTION<br>STARTS IN 3 KM | 14.3 | 76.4 | 38.6 |
| CONSTRUCTION<br>STARTS IN 3 KM | 15.6 | 69.0 | 39.1 |
| 2 LEFT LANES BLOCKED<br>3 KM AHEAD | 16.5 | 80.7 | 34.7 |
| LEFT LANE BLOCKED<br>3 KM AHEAD | 16.3 | 56.0 | 48.4 |
| EXPRESS LANES<br>CLOSED AHEAD<br>USE COLLECTOR LANES | 11.3 | 96.8 | 15.2 |

10. You are travelling on Highway 401 in RUSH HOUR. Traffic is congested as it usually is in rush hour. Rank the following sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

NORMAL CONGESTION AHEAD NEXT 5 KM 17.5 %

RUSH HOUR CONDITIONS AHEAD NEXT 5 KM 65.8 %

no message (blank sign) 5.4 %

time and/or weather messages (eg TIME 4:31 - CLOUDY) 11.3 %

11. You are travelling on Highway 401. Traffic is FLOWING FREELY. Rank the following messages, with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

NORMAL TRAFFIC NEXT 5 KM 47.9 %

no message (blank sign) 13.0 %

Messages giving directions which are also given on nearby signs (eg AVENUE ROAD EXIT 1 KM) 25.7 %

time and/or weather messages (eg TIME 4:31 - CLOUDY) 13.4 %

12. You are travelling on Highway 401 in the COLLECTOR lanes.
You are planning to EXIT in 6 km, which is 3 exits beyond where you are now.

You see the following messages on a traffic sign above the roadway. Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE IN THE COLLECTOR LANES | SLOW DOWN IMMEDIATELY % | LEAVE HIGHWAY AT NEXT EXIT % | SLOW DOWN WHEN I SEE TRAFFIC BACKUP % | CHANGE TO EXPRESS LANES % |
|---|---|---|---|---|
| MODERATE CONGESTION CLEARS IN 10 KM | 11.9 | 20.2 | 59.2 | 21.5 |
| SPEED 20-40 KM/H NEXT 3 KM | 31.9 | 20.4 | 43.4 | 17.1 |
| SPEED 20-40 KM/H NEXT 10 KM | 27.3 | 34.5 | 33.4 | 24.7 |
| HEAVY CONGESTION STARTS IN 1 KM | 28.9 | 48.1 | 23.9 | 23.4 |
| CONSTRUCTION STARTS IN 1 KM REDUCE SPEED | 46.2 | 25.8 | 29.3 | 22.8 |
| HEAVY CONGESTION CLEARS IN 10 KM | 13.0 | 44.9 | 34.7 | 25.4 |
| LEFT LANE BLOCKED 1 KM AHEAD | 25.4 | 17.4 | 49.2 | 21.0 |
| COLLECTORS CLOSED AHEAD THROUGH TRAFFIC USE EXPRESS LANES | 7.4 | 44.2 | 11.7 | 52.7 |
| MINOR CONGESTION CLEARS IN 10 KM | 13.5 | 20.4 | 59.2 | 20.2 |

13. What does this sign message mean to you? Please circle the number of your answer.

SPEED 30-40 KM/H
NEXT 3 KM

1. The legal speed limit is 40 km/h for the next 3 km. 17.5 %
2. The average speed of the traffic is between 30 and 40 km/h for the next 3 km. 42.4 %
3. The recommended speed is 30 to 40 km/h for the next 3 km. 38.7 %
4. Don't know 1.5 %

14. What does this sign message mean to you? Please circle the number of your answer.

HEAVY CONGESTION
NEXT 3 KM

1. Heavy congestion starts in 3 km. 26.8 %
2. Heavy congestion ends in 3 km. 70.1 %
3. Don't know. 3.2 %

Is there anything else about changeable message signs you feel we should have asked about?

Do you have any other comments?

*THANK YOU FOR YOUR HELP*

WHEN THE QUESTIONNAIRE IS HANDED IN THE INTERVIEWER WILL CHECK THAT IT IS COMPLETED.

# APPENDIX B3

## Main Survey: Tables of Results

---

**NOTE:** Messages are numbered in sequence corresponding to that shown in question.

## Table 1.0

1. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving very slowly (stop and go). Please rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, down to 3 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

SEVERE TRAFFIC DELAY STARTS IN 1 KM 31.7 %

HEAVY CONGESTION STARTS IN 1 KM 45.6 %

TRAFFIC JAM STARTS IN 1 KM 22.6 %

**CMS SURVEY ==========> Report based on AGE GROUPS.**

**Data taken from both types of questionnaire.**

**Question # 1 Number of people ranking each message as 1**

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 46 (30.3%) | 104 (31.1%) | 21 (39.6%) | 171 (31.7%) |
| M2. | 73 (48.0%) | 154 (46.1%) | 19 (35.8%) | 246 (45.6%) |
| M3. | 33 (21.7%) | 76 (22.8%) | 13 (24.5%) | 122 (22.6%) |

**Question # 1 Number of people ranking each message as 3**

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 51 (33.6%) | 120 (35.9%) | 19 (35.8%) | 190 (35.3%) |
| M2. | 29 (19.1%) | 70 (21.0%) | 15 (28.3%) | 114 (21.2%) |
| M3. | 72 (47.4%) | 144 (43.1%) | 19 (35.8%) | 235 (43.6%) |

## Table 1.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 1 Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 65 (30.7%) | 22 (33.8%) | 57 (32.9%) | 27 (30.3%) | 171 (31.7%) |
| M2. | 100(47.2%) | 24 (36.9%) | 81 (46.8%) | 41 (46.1%) | 246 (45.6%) |
| M3. | 47 (22.2%) | 19 (29.2%) | 35 (20.2%) | 21 (23.6%) | 122 (22.6%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 1 Number of people ranking each message as 3

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 74 (34.9%) | 20 (30.8%) | 65 (37.6%) | 31 (34.8%) | 190 (35.3%) |
| M2. | 44 (20.8%) | 24 (36.9%) | 27 (15.6%) | 19 (21.3%) | 114 (21.2%) |
| M3. | 94 (44.3%) | 21 (32.3%) | 81 (46.8%) | 39 (43.8%) | 235 (43.6%) |

## Table 1.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 1 Number of people ranking each message as 1

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 145 (31.8%) | 25 (30.5%) | 170 (31.6%) |
| M2. | 212 (46.5%) | 34 (41.5%) | 246 (45.7%) |
| M3. | 99 (21.7%) | 23 (28.0%) | 122 (22.7%) |

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 1 Number of people ranking each message as 3

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 159 (34.9%) | 31 (37.8%) | 190 (35.3%) |
| M2. | 98 (21.5%) | 15 (18.3%) | 113 (21.0%) |
| M3. | 199 (43.6%) | 36 (43.9%) | 235 (43.7%) |

## Table 1.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 1

Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 6 (26.1%) | 84 (29.5%) | 81 (35.1%) | 171 (31.7%) |
| M2. | 9 (39.1%) | 139 (48.8%) | 98 (42.4%) | 246 (45.6%) |
| M3. | 8 (34.8%) | 62 (21.8%) | 52 (22.5%) | 122 (22.6%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 1
Number of people ranking each message as 3

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 10 (43.5%) | 99 (34.7%) | 81 (35.1%) | 190 (35.3%) |
| M2. | 6 (26.1%) | 59 (20.7%) | 49 (21.2%) | 114 (21.2%) |
| M3. | 7 (30.4%) | 127 (44.6%) | 101 (43.7%) | 235 (43.6%) |

**Table 2.0**

2. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving somewhat slowly (slow moving with occasional stops). Please rank the following traffic sign messages, with 1 for most preferred, 2 for next most preferred, and 3 for least preferred.

| | |
|---|---|
| MODERATE CONGESTION<br>STARTS IN 1 KM | 26.9% |
| TRAFFIC DELAY<br>STARTS IN 1 KM | 22.6% |
| TRAFFIC SLOWDOWN<br>STARTS IN 1 KM | 50.5% |

```
CMS SURVEY ==========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 2 Number of people ranking each message as 1

      16 - 25     26 - 55      > 55        Totals

M1.  45 (29.6%) 94 (28.1%)  6 (11.3%)  145 (26.9%)

M2.  37 (24.3%) 72 (21.6%)  13 (24.5%) 122 (22.6%)

M3.  70 (46.1%) 168 (50.3%) 34 (64.2%) 272 (50.5%)


Question # 2 Number of people ranking each message as 3

      16 - 25     26 - 55      > 55        Totals

M1.  54 (35.5%) 126 (37.7%) 23 (43.4%) 203 (37.7%)

M2.  76 (50.0%) 158 (47.3%) 24 (45.3%) 258 (47.9%)

M3.  22 (14.5%) 50 (15.0%) 6 (11.3%) 78 (14.5%)
```

## Table 2.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 2 Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 52 (24.5%) | 18 (27.7%) | 53 (30.6%) | 22 (24.7%) | 145 (26.9%) |
| M2. | 57 (26.9%) | 13 (20.0%) | 33 (19.1%) | 19 (21.3%) | 122 (22.6%) |
| M3. | 103 (48.6%) | 34 (52.3%) | 87 (50.3%) | 48 (53.9%) | 272 (50.5%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 2 Number of people ranking each message as 3

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 72 (34.0%) | 31 (47.7%) | 66 (38.2%) | 34 (38.2%) | 203 (37.7%) |
| M2. | 101 (47.6%) | 29 (44.6%) | 85 (49.1%) | 43 (48.3%) | 258 (47.9%) |
| M3. | 39 (18.4%) | 5 ( 7.7%) | 22 (12.7%) | 12 (13.5%) | 78 (14.5%) |

## Table 2.2

```
CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 2 Number of people ranking each message as 1

           Group 1 Group 2 Totals

M1.  126 (27.6%) 19 (23.2%) 145 (27.0%)

M2.  103 (22.6%) 19 (23.2%) 122 (22.7%)

M3.  227 (49.8%) 44 (53.7%) 271 (50.4%)


CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 2 Number of people ranking each message as 3

     Group 1      Group 2     Totals

M1.  171 (37.5%) 31 (37.8%) 202 (37.5%)

M2.  219 (48.0%) 39 (47.6%) 258 (48.0%)

M3.  66 (14.5%)  12 (14.6%)  78 (14.5%)
```

## Table 2.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 2
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 6 (26.1%) | 70 (24.6%) | 69 (29.9%) | 145 (26.9%) |
| M2. | 4 (17.4%) | 64 (22.5%) | 54 (23.4%) | 122 (22.6%) |
| M3. | 13 (56.5%) | 151 (53.0%) | 108 (46.8%) | 272 (50.5%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 2
Number of people ranking each message as 3

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 6 (26.1%) | 111 (38.9%) | 86 (37.2%) | 203 (37.7%) |
| M2. | 13 (56.5%) | 137 (48.1%) | 108 (46.8%) | 258 (47.9%) |
| M3. | 4 (17.4%) | 37 (13.0%) | 37 (16.0%) | 78 (14.5%) |

**Tables 3.0, 3.1**

3. How far in advance of the start of unusual congestion do you think information about the delay should be given to drivers?
Please circle the number of your answer.

| | | |
|---|---|---|
| 1. | less than 2 km. (about 1 mile) | 10.2 % |
| 2. | 2 to 3 km. (about 1-2 miles) | 34.9 % |
| 3. | 4 to 5 km. (about 2 1/2 to 3 miles) | 32.7 % |
| 4. | 6 to 8 km. (about 4 - 5 miles) | 13.8 % |
| 5. | more than 8 km (more than 5 miles) | 8.4 % |

CMS SURVEY ==========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 3 Totals for each response.

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| 1. | 13 ( 8.6%) | 38 (11.4%) | 4 ( 7.5%) | 55 (10.2%) |
| 2. | 54 (35.5%) | 113 (33.9%) | 21 (39.6%) | 188 (34.9%) |
| 3. | 54 (35.5%) | 107 (32.1%) | 15 (28.3%) | 176 (32.7%) |
| 4. | 19 (12.5%) | 45 (13.5%) | 10 (18.9%) | 74 (13.8%) |
| 5. | 12 ( 7.9%) | 30 ( 9.0%) | 3 ( 5.7%) | 45 ( 8.4%) |

CMS SURVEY ==========> Report based on 401 EXPERIENCE

Question # 3 Totals for each response.

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| 1. | 21 (10.0%) | 7 (10.8%) | 21 (12.1%) | 6 ( 6.7%) | 55 (10.2%) |
| 2. | 76 (36.0%) | 18 (27.7%) | 57 (32.9%) | 37 (41.6%) | 188 (34.9%) |
| 3. | 76 (36.0%) | 22 (33.8%) | 56 (32.4%) | 22 (24.7%) | 176 (32.7%) |
| 4. | 22 (10.4%) | 11 (16.9%) | 25 (14.5%) | 16 (18.0%) | 74 (13.8%) |
| 5. | 16 ( 7.6%) | 7 (10.8%) | 14 ( 8.1%) | 8 ( 9.0%) | 45 ( 8.4%) |

**Tables 3.2, 3.3**

```
CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 3 Totals for each response.

        Group 1      Group 2      Totals

 1.    48 (10.5%)  7 ( 8.5%)  55 (10.2%)

 2.   159 (34.9%) 29 (35.4%) 188 (35.0%)

 3.   150 (33.0%) 26 (31.7%) 176 (32.8%)

 4.    59 (13.0%) 15 (18.3%)  74 (13.8%)

 5.    39 ( 8.6%)  5 ( 6.1%)  44 ( 8.2%)
```

```
CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 3 Totals for each response.

      Pub. Sch.  High Sch.  University Totals

 1.  2 ( 8.7%)  39 (13.7%) 14 ( 6.1%) 55 (10.2%)

 2.  7 (30.4%) 100 (35.1%) 81 (35.2%) 188 (34.9%)

 3.  9 (39.1%)  83 (29.1%) 84 (36.5%) 176 (32.7%)

 4.  3 (13.0%)  41 (14.4%) 30 (13.0%) 74 (13.8%)

 5.  2 ( 8.7%)  22 ( 7.7%) 21 ( 9.1%) 45 ( 8.4%)
```

### Table 4.0

4. Imagine there is a MAJOR ACCIDENT ahead.

Which of the messages below would you prefer? Rank these messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

| | |
|---|---|
| MAJOR ACCIDENT AHEAD<br>1 KM BEFORE AVENUE ROAD | 30.4 % |
| MAJOR ACCIDENT AHEAD<br>20 MINUTE DELAY | 8.0 % |
| MAJOR ACCIDENT AHEAD<br>LEFT 2 LANES BLOCKED | 36.0 % |
| MAJOR ACCIDENT AHEAD<br>CONGESTION FOR 5 KM | 25.6 % |

```
CMS SURVEY ===========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 4 Number of people ranking each message as 1

       16 - 25      26 - 55      > 55       Totals

M1.   50 (32.9%) 100 (29.9%) 14 (26.4%) 164 (30.4%)

M2.   10 ( 6.6%)  29 ( 8.7%)  4 ( 7.5%)  43 ( 8.0%)

M3.   50 (32.9%) 126 (37.7%) 18 (34.0%) 194 (36.0%)

M4.   42 (27.6%)  79 (23.7%) 17 (32.1%) 138 (25.6%)


Question # 4 Number of people ranking each message as 4

       16 - 25         26 - 55      > 55      Totals

M1.   47 (30.9%)  93 (27.8%) 22 (41.5%) 162 (30.1%)

M2.   67 (44.1%) 150 (44.9%) 20 (37.7%) 237 (44.0%)

M3.   13 ( 8.6%)  31 ( 9.3%)  5 ( 9.4%)  49 ( 9.1%)

M4.   25 (16.4%)  60 (18.0%)  6 (11.3%)  91 (16.9%)
```

## Table 4.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 4
Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 61 (28.8%) | 16 (24.6%) | 62 (35.8%) | 25 (28.1%) | 164 (30.4%) |
| M2. | 16 ( 7.5%) | 5 ( 7.7%) | 18 (10.4%) | 4 ( 4.5%) | 43 ( 8.0%) |
| M3. | 88 (41.5%) | 16 (24.6%) | 53 (30.6%) | 37 (41.6%) | 194 (36.0%) |
| M4. | 47 (22.2%) | 28 (43.1%) | 40 (23.1%) | 23 (25.8%) | 138 (25.6%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 4
Number of people ranking each message as 4

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 67 (31.6%) | 16 (24.6%) | 50 (28.9%) | 29 (32.6%) | 162 (30.1%) |
| M2. | 93 (43.9%) | 33 (50.8%) | 67 (38.7%) | 44 (49.4%) | 237 (44.0%) |
| M3. | 14 ( 6.6%) | 9 (13.8%) | 19 (11.0%) | 7 ( 7.9%) | 49 ( 9.1%) |
| M4. | 38 (17.9%) | 7 (10.8%) | 37 (21.4%) | 9 (10.1%) | 91 (16.9%) |

## Table 4.2

```
CMS SURVEY  ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 4
Number of people ranking each message as 1

            Group 1        Group 2        Totals

M1.        136 (29.8%)   27 (32.9%)  163 (30.3%)

M2.         39 ( 8.6%)    4 ( 4.9%)   43 ( 8.0%)

M3.        164 (36.0%)   30 (36.6%)  194 (36.1%)

M4.        117 (25.7%)   21 (25.6%)  138 (25.7%)
```

```
CMS SURVEY  ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 4
Number of people ranking each message as 4

            Group 1        Group 2        Totals

M1.        135 (29.6%)   27 (32.9%)  162 (30.1%)

M2.        199 (43.6%)   38 (46.3%)  237 (44.1%)

M3.         42 ( 9.2%)    7 ( 8.5%)   49 ( 9.1%)

M4.         80 (17.5%)   10 (12.2%)   90 (16.7%)
```

## Table 4.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 4
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 4 (17.4%) | 86 (30.2%) | 74 (32.0%) | 164 (30.4%) |
| M2. | 3 (13.0%) | 22 ( 7.7%) | 18 ( 7.8%) | 43 ( 8.0%) |
| M3. | 8 (34.8%) | 100 (35.1%) | 86 (37.2%) | 194 (36.0%) |
| M4. | 8 (34.8%) | 77 (27.0%) | 53 (22.9%) | 138 (25.6%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 4
Number of people ranking each message as 4

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 11 (47.8%) | 89 (31.2%) | 62 (26.8%) | 162 (30.1%) |
| M2. | 8 (34.8%) | 126 (44.2%) | 103 (44.6%) | 237 (44.0%) |
| M3. | 2 ( 8.7%) | 26 ( 9.1%) | 21 ( 9.1%) | 49 ( 9.1%) |
| M4. | 2 ( 8.7%) | 44 (15.4%) | 45 (19.5%) | 91 (16.9%) |

## Table 5.0

5. The traffic is STOP AND GO ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc, down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| DELAY 3 TO 7 MIN.<br>NEXT 3 KM. | 15.0 % |
| SPEED 20-40 KM/H.<br>NEXT 3 KM. | 29.5 % |
| HEAVY CONGESTION<br>NEXT 3 KM. | 47.5 % |
| TRAVEL TIME 5-9 MIN.<br>NEXT 3 KM. | 8.0 % |

CMS SURVEY ===========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 1

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 26 (17.1%) | 48 (14.4%) | 7 (13.2%) | 81 (15.0%) |
| M2. | 51 (33.6%) | 90 (26.9%) | 18 (34.0%) | 159 (29.5%) |
| M3. | 64 (42.1%) | 171 (51.2%) | 21 (39.6%) | 256 (47.5%) |
| M4. | 11 ( 7.2%) | 25 ( 7.5%) | 7 (13.2%) | 43 ( 8.0%) |

Question # 5
Number of people ranking each message as 4

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 27 (17.8%) | 73 (21.9%) | 11 (20.8%) | 111 (20.6%) |
| M2. | 25 (16.4%) | 59 (17.7%) | 6 (11.3%) | 90 (16.7%) |
| M3. | 32 (21.1%) | 55 (16.5%) | 9 (17.0%) | 96 (17.8%) |
| M4. | 68 (44.7%) | 147 (44.0%) | 27 (50.9%) | 242 (44.9%) |

## Table 5.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 31 (14.6%) | 11 (16.9%) | 26 (15.0%) | 13 (14.6%) | 81 (15.0%) |
| M2. | 58 (27.4%) | 23 (35.4%) | 49 (28.3%) | 29 (32.6%) | 159 (29.5%) |
| M3. | 102 (48.1%) | 27 (41.5%) | 86 (49.7%) | 41 (46.1%) | 256 (47.5%) |
| M4. | 21 ( 9.9%) | 4 ( 6.2%) | 12 ( 6.9%) | 6 ( 6.7%) | 43 ( 8.0%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 4

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 49 (23.1%) | 9 (13.8%) | 40 (23.1%) | 13 (14.6%) | 111 (20.6%) |
| M2. | 35 (16.5%) | 11 (16.9%) | 32 (18.5%) | 12 (13.5%) | 90 (16.7%) |
| M3. | 32 (15.1%) | 13 (20.0%) | 34 (19.7%) | 17 (19.1%) | 96 (17.8%) |
| M4. | 96 (45.3%) | 32 (49.2%) | 67 (38.7%) | 47 (52.8%) | 242 (44.9%) |

## Table 5.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 1

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 70 (15.4%) | 11 (13.4%) | 81 (15.1%) |
| M2. | 134 (29.4%) | 24 (29.3%) | 158 (29.4%) |
| M3. | 215 (47.1%) | 41 (50.0%) | 256 (47.6%) |
| M4. | 37 ( 8.1%) | 6 ( 7.3%) | 43 ( 8.0%) |

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 4

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 91 (20.0%) | 20 (24.4%) | 111 (20.6%) |
| M2. | 78 (17.1%) | 12 (14.6%) | 90 (16.7%) |
| M3. | 78 (17.1%) | 17 (20.7%) | 95 (17.7%) |
| M4. | 209 (45.8%) | 33 (40.2%) | 242 (45.0%) |

## Table 5.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 2 ( 8.7%) | 42 (14.7%) | 37 (16.0%) | 81 (15.0%) |
| M2. | 5 (21.7%) | 82 (28.8%) | 72 (31.2%) | 159 (29.5%) |
| M3. | 14 (60.9%) | 138 (48.4%) | 104 (45.0%) | 256 (47.5%) |
| M4. | 2 ( 8.7%) | 23 ( 8.1%) | 18 ( 7.8%) | 43 ( 8.0%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 5
Number of people ranking each message as 4

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 7 (30.4%) | 60 (21.1%) | 44 (19.0%) | 111 (20.6%) |
| M2. | 1 ( 4.3%) | 55 (19.3%) | 34 (14.7%) | 90 (16.7%) |
| M3. | 3 (13.0%) | 45 (15.8%) | 48 (20.8%) | 96 (17.8%) |
| M4. | 12 (52.2%) | 125 (43.9%) | 105 (45.5%) | 242 (44.9%) |

**Table 6.0**

6. The traffic is MOVING SLOWLY WITH OCCASIONAL STOPS ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| DELAY 1 TO 3 MIN.<br>NEXT 3 KM. | 13.7 % |
| SPEED 40-60 KM/H.<br>NEXT 3 KM. | 30.4 % |
| MODERATE CONGESTION<br>NEXT 3 KM. | 48.6 % |
| TRAVEL TIME 3-5 MIN.<br>NEXT 3 KM. | 7.2 % |

```
CMS SURVEY    ===========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 1

             16 - 25         26 - 55        > 55        Totals

M1.          21 (13.8%)   47 (14.1%)    6 (11.3%)   74 (13.7%)

M2.          49 (32.2%)   97 (29.0%)   18 (34.0%)  164 (30.4%)

M3.          69 (45.4%)  169 (50.6%)   24 (45.3%)  262 (48.6%)

M4.          13 ( 8.6%)   21 ( 6.3%)    5 ( 9.4%)   39 ( 7.2%)


Question # 6
Number of people ranking each message as 4

             16 - 25         26 - 55        > 55        Totals

M1.          34 (22.4%)   75 (22.5%)   15 (28.3%)  124 (23.0%)

M2.          26 (17.1%)   72 (21.6%)   15 (28.3%)  113 (21.0%)

M3.          27 (17.8%)   56 (16.8%)    3 ( 5.7%)   86 (16.0%)

M4.          65 (42.8%)  131 (39.2%)   20 (37.7%)  216 (40.1%)
```

## Table 6.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 28 (13.2%) | 9 (13.8%) | 25 (14.5%) | 12 (13.5%) | 74 (13.7%) |
| M2. | 58 (27.4%) | 26 (40.0%) | 54 (31.2%) | 26 (29.2%) | 164 (30.4%) |
| M3. | 103 (48.6%) | 26 (40.0%) | 86 (49.7%) | 47 (52.8%) | 262 (48.6%) |
| M4. | 23 (10.8%) | 4 ( 6.2%) | 8 ( 4.6%) | 4 ( 4.5%) | 39 ( 7.2%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 4

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 52 (24.5%) | 13 (20.0%) | 40 (23.1%) | 19 (21.3%) | 124 (23.0%) |
| M2. | 46 (21.7%) | 12 (18.5%) | 36 (20.8%) | 19 (21.3%) | 113 (21.0%) |
| M3. | 32 (15.1%) | 14 (21.5%) | 28 (16.2%) | 12 (13.5%) | 86 (16.0%) |
| M4. | 82 (38.7%) | 26 (40.0%) | 69 (39.9%) | 39 (43.8%) | 216 (40.1%) |

## Table 6.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 1

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 62 (13.6%) | 12 (14.6%) | 74 (13.8%) |
| M2. | 141 (30.9%) | 22 (26.8%) | 163 (30.3%) |
| M3. | 219 (48.0%) | 43 (52.4%) | 262 (48.7%) |
| M4. | 34 ( 7.5%) | 5 ( 6.1%) | 39 ( 7.2%) |

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 4

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 105 (23.0%) | 19 (23.2%) | 124 (23.0%) |
| M2. | 96 (21.1%) | 17 (20.7%) | 113 (21.0%) |
| M3. | 70 (15.4%) | 15 (18.3%) | 85 (15.8%) |
| M4. | 185 (40.6%) | 31 (37.8%) | 216 (40.1%) |

## Table 6.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 2 ( 8.7%) | 43 (15.1%) | 29 (12.6%) | 74 (13.7%) |
| M2. | 8 (34.8%) | 83 (29.1%) | 73 (31.6%) | 164 (30.4%) |
| M3. | 11 (47.8%) | 137 (48.1%) | 114 (49.4%) | 262 (48.6%) |
| M4. | 2 ( 8.7%) | 22 ( 7.7%) | 15 ( 6.5%) | 39 ( 7.2%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 6
Number of people ranking each message as 4

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 9 (39.1%) | 63 (22.1%) | 52 (22.5%) | 124 (23.0%) |
| M2. | 6 (26.1%) | 60 (21.1%) | 47 (20.3%) | 113 (21.0%) |
| M3. | 3 (13.0%) | 47 (16.5%) | 36 (15.6%) | 86 (16.0%) |
| M4. | 5 (21.7%) | 115 (40.4%) | 96 (41.6%) | 216 (40.1%) |

## Table 7.0

7. Traffic is SLOW BUT KEEPS MOVING. Rank the following traffic sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| DELAY UP TO 1 MIN<br>NEXT 3 KM | 9.5% |
| SPEED 60-80 KM/H<br>NEXT 3 KM | 32.7% |
| MINOR CONGESTION<br>NEXT 3 KM | 50.1% |
| TRAVEL TIME 2-3 MIN<br>NEXT 3 KM | 7.8% |

CMS SURVEY ===========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 7
Number of people ranking each message as 1

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 13 ( 8.6%) | 35 (10.5%) | 3 ( 5.7%) | 51 ( 9.5%) |
| M2. | 55 (36.2%) | 102 (30.5%) | 19 (35.8%) | 176 (32.7%) |
| M3. | 74 (48.7%) | 171 (51.2%) | 25 (47.2%) | 270 (50.1%) |
| M4. | 10 (6.6%) | 26 ( 7.8%) | 6 (11.3%) | 42 ( 7.8%) |

Question # 7
Number of people ranking each message as 4

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 46 (30.3%) | 75 (22.5%) | 15 (28.3%) | 136 (25.2%) |
| M2. | 24 (15.8%) | 73 (21.9%) | 17 (32.1%) | 114 (21.2%) |
| M3. | 21 (13.8%) | 51 (15.3%) | 5 ( 9.4%) | 77 (14.3%) |
| M4. | 61 (40.1%) | 135 (40.4%) | 16 (30.2%) | 212 (39.3%) |

# Table 7.1

**CMS SURVEY ======> Report based on 401 EXPERIENCE.**

**Data taken from both types of questionnaire.**

**Question # 7**
**Number of people ranking each message as 1**

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 20 ( 9.4%) | 6 ( 9.2%) | 19 (11.0%) | 6 ( 6.7%) | 51 ( 9.5%) |
| M2. | 62 (29.2%) | 26 (40.0%) | 59 (34.1%) | 29 (32.6%) | 176 (32.7%) |
| M3. | 106 (50.0%) | 28 (43.1%) | 89 (51.4%) | 47 (52.8%) | 270 (50.1%) |
| M4. | 24 (11.3%) | 5 ( 7.7%) | 6 ( 3.5%) | 7 ( 7.9%) | 42 ( 7.8%) |

**CMS SURVEY ======> Report based on 401 EXPERIENCE.**

**Data taken from both types of questionnaire.**

**Question # 7**
**Number of people ranking each message as 4**

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 55 (25.9%) | 12 (18.5%) | 47 (27.2%) | 22 (24.7%) | 136 (25.2%) |
| M2. | 49 (23.1%) | 13 (20.0%) | 34 (19.7%) | 18 (20.2%) | 114 (21.2%) |
| M3. | 23 (10.8%) | 12 (18.5%) | 27 (15.6%) | 15 (16.9%) | 77 (14.3%) |
| M4. | 85 (40.1%) | 28 (43.1%) | 65 (37.6%) | 34 (38.2%) | 212 (39.3%) |

## Table 7.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 7
Number of people ranking each message as 1

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 42 ( 9.2%) | 9 (11.0%) | 51 ( 9.5%) |
| M2. | 148 (32.5%) | 27 (32.9%) | 175 (32.5%) |
| M3. | 228 (50.0%) | 42 (51.2%) | 270 (50.2%) |
| M4. | 38 ( 8.3%) | 4 ( 4.9%) | 42 ( 7.8%) |

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 7
Number of people ranking each message as 4

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 116 (25.4%) | 20 (24.4%) | 136 (25.3%) |
| M2. | 97 (21.3%) | 17 (20.7%) | 114 (21.2%) |
| M3. | 61 (13.4%) | 16 (19.5%) | 77 (14.3%) |
| M4. | 182 (39.9%) | 29 (35.4%) | 211 (39.2%) |

## Table 7.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 7
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 0 ( 0.0%) | 30 (10.5%) | 21 ( 9.1%) | 51 ( 9.5%) |
| M2. | 8 (34.8%) | 86 (30.2%) | 82 (35.5%) | 176 (32.7%) |
| M3. | 13 (56.5%) | 145 (50.9%) | 112 (48.5%) | 270 (50.1%) |
| M4. | 2 ( 8.7%) | 24 ( 8.4%) | 16 ( 6.9%) | 42 ( 7.8%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 7
Number of people ranking each message as 4

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 8 (34.8%) | 73 (25.6%) | 55 (23.8%) | 136 (25.2%) |
| M2. | 4 (17.4%) | 63 (22.1%) | 47 (20.3%) | 114 (21.2%) |
| M3. | 1 ( 4.3%) | 41 (14.4%) | 35 (15.2%) | 77 (14.3%) |
| M4. | 10 (43.5%) | 108 (37.9%) | 94 (40.7%) | 212 (39.3%) |

**Table 8.0**

8. You are travelling on Highway 401 in the EXPRESS lanes.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a checkmark (√) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY % | TAKE COLLECTOR LANES AT NEXT OPPORTUNITY % | SLOW DOWN WHEN I SEE TRAFFIC BACKUP % |
|---|---|---|---|
| SPEED 40-60 KM/H NEXT 10 KM | 34.5 | 50.5 | 33.6 |
| ICY CONDITIONS AHEAD | 90.5 | 7.6 | 5.9 |
| MODERATE CONGESTION CLEARS IN 10 KM | 12.1 | 53.8 | 46.2 |
| ACCIDENT 1 KM AHEAD | 45.1 | 63.1 | 20.6 |
| HEAVY CONGESTION CLEARS IN 3 KM | 20.2 | 43.8 | 46.9 |
| MAJOR ACCIDENT 1 KM AHEAD | 43.2 | 71.6 | 17.3 |
| HEAVY CONGESTION STARTS IN 1 KM | 33.6 | 65.9 | 28.6 |
| HEAVY CONGESTION STARTS IN 1 KM REDUCE SPEED | 58.6 | 52.7 | 21.2 |
| HEAVY CONGESTION CLEARS IN 10 KM | 16.0 | 65.5 | 35.1 |
| SPEED 40-60 KM/H AHEAD REDUCE DELAY USE COLLECTOR LANES | 19.1 | 90.4 | 18.4 |

## Table 8.0 - Contd.

CMS SURVEY ==========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 8
Percentages.

16 - 25

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 22.4 | 86.2 | 7.2 | 36.8 | 19.7 | 31.6 | 25.0 | 49.3 | 9.2 | 11.2 |
| 2: | 60.5 | 7.9 | 61.8 | 70.4 | 45.4 | 74.3 | 69.1 | 53.3 | 67.8 | 92.8 |
| 3: | 38.8 | 9.9 | 42.1 | 20.4 | 47.4 | 21.1 | 28.9 | 27.0 | 40.1 | 19.7 |

26 - 55

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 38.3 | 91.9 | 12.3 | 47.6 | 18.9 | 46.1 | 35.6 | 61.4 | 17.4 | 21.9 |
| 2: | 47.6 | 8.1 | 50.6 | 62.9 | 43.1 | 73.4 | 67.1 | 55.7 | 64.4 | 91.0 |
| 3: | 31.7 | 4.5 | 49.1 | 20.4 | 48.8 | 16.5 | 28.1 | 18.9 | 34.1 | 19.5 |

>55

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 45.3 | 94.3 | 24.5 | 52.8 | 30.2 | 58.5 | 45.3 | 67.9 | 26.4 | 24.5 |
| 2: | 39.6 | 3.8 | 50.9 | 43.4 | 43.4 | 52.8 | 49.1 | 32.1 | 66.0 | 79.2 |
| 3: | 30.2 | 3.8 | 39.6 | 22.6 | 34.0 | 11.3 | 30.2 | 18.9 | 26.4 | 7.5 |

All groups:

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 34.5 | 90.5 | 12.1 | 45.1 | 20.2 | 43.2 | 33.6 | 58.6 | 16.0 | 19.1 |
| 2: | 50.5 | 7.6 | 53.8 | 63.1 | 43.8 | 71.6 | 65.9 | 52.7 | 65.5 | 90.4 |
| 3: | 33.6 | 5.9 | 46.2 | 20.6 | 46.9 | 17.3 | 28.6 | 21.2 | 35.1 | 18.4 |

## Table 8.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.
Question # 8: Percentages.

Group 1:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 27.8 | 90.6 | 7.5 | 45.8 | 16.0 | 42.0 | 32.1 | 53.8 | 11.8 | 15.6 | |
| 2: | 50.9 | 9.0 | 56.6 | 59.9 | 44.8 | 73.1 | 67.9 | 56.6 | 70.8 | 88.7 | |
| 3: | 34.0 | 6.1 | 47.2 | 19.3 | 48.6 | 14.6 | 25.0 | 22.2 | 32.5 | 19.8 | |

Group 2:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 29.2 | 89.2 | 9.2 | 43.1 | 24.6 | 35.4 | 32.3 | 55.4 | 13.8 | 23.1 | |
| 2: | 60.0 | 12.3 | 63.1 | 64.6 | 44.6 | 69.2 | 73.8 | 53.8 | 67.7 | 90.8 | |
| 3: | 36.9 | 6.2 | 44.6 | 23.1 | 44.6 | 23.1 | 26.2 | 26.2 | 43.1 | 21.5 | |

Group 3:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 39.9 | 90.2 | 15.0 | 45.1 | 22.0 | 48.6 | 36.4 | 62.4 | 21.4 | 23.1 | |
| 2: | 49.7 | 5.8 | 54.9 | 67.6 | 41.6 | 72.3 | 61.8 | 51.4 | 59.5 | 92.5 | |
| 3: | 32.9 | 5.8 | 43.4 | 20.2 | 45.1 | 17.3 | 31.2 | 21.4 | 36.4 | 17.9 | |

Group 4:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 43.8 | 92.1 | 19.1 | 44.9 | 23.6 | 41.6 | 32.6 | 65.2 | 16.9 | 16.9 | |
| 2: | 43.8 | 4.5 | 38.2 | 60.7 | 44.9 | 68.5 | 62.9 | 44.9 | 62.9 | 89.9 | |
| 3: | 31.5 | 5.6 | 50.6 | 22.5 | 48.3 | 19.1 | 33.7 | 14.6 | 32.6 | 13.5 | |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 34.5 | 90.5 | 12.1 | 45.1 | 20.2 | 43.2 | 33.6 | 58.6 | 16.0 | 19.1 | |
| 2: | 50.5 | 7.6 | 53.8 | 63.1 | 43.8 | 71.6 | 65.9 | 52.7 | 65.5 | 90.4 | |
| 3: | 33.6 | 5.9 | 46.2 | 20.6 | 46.9 | 17.3 | 28.6 | 21.2 | 35.1 | 18.4 | |

## Table 8.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 8
Percentages.

Group 1:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 32.9 | 89.9 | 10.3 | 45.2 | 19.7 | 43.6 | 34.2 | 58.1 | 16.2 | 20.0 |
| 2: | 51.1 | 7.9 | 56.1 | 64.0 | 44.1 | 72.4 | 66.7 | 54.6 | 67.1 | 90.4 |
| 3: | 35.1 | 6.6 | 47.1 | 20.8 | 47.4 | 17.3 | 29.2 | 21.3 | 34.9 | 19.1 |

Group 2:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 43.9 | 93.9 | 22.0 | 45.1 | 23.2 | 41.5 | 30.5 | 62.2 | 14.6 | 13.4 |
| 2: | 46.3 | 6.1 | 40.2 | 57.3 | 41.5 | 67.1 | 61.0 | 41.5 | 56.1 | 90.2 |
| 3: | 25.6 | 2.4 | 41.5 | 19.5 | 45.1 | 17.1 | 25.6 | 20.7 | 36.6 | 14.6 |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 34.5 | 90.4 | 12.1 | 45.1 | 20.2 | 43.2 | 33.6 | 58.6 | 16.0 | 18.9 |
| 2: | 50.3 | 7.6 | 53.6 | 62.9 | 43.6 | 71.4 | 65.7 | 52.5 | 65.3 | 90.2 |
| 3: | 33.6 | 5.9 | 46.2 | 20.6 | 46.9 | 17.3 | 28.6 | 21.2 | 35.1 | 18.4 |

## Table 8.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question # 8
Percentages.

Public School

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 43.5 | 91.3 | 8.7 | 34.8 | 26.1 | 47.8 | 43.5 | 69.6 | 13.0 | 13.0 | |
| 2: | 39.1 | 13.0 | 43.5 | 52.2 | 47.8 | 52.2 | 47.8 | 21.7 | 56.5 | 78.3 | |
| 3: | 30.4 | 0.0 | 56.5 | 17.4 | 30.4 | 8.7 | 17.4 | 13.0 | 34.8 | 17.4 | |

High School

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 34.7 | 90.5 | 11.9 | 45.3 | 20.4 | 41.1 | 34.4 | 53.3 | 16.8 | 18.9 | |
| 2: | 50.9 | 5.3 | 56.1 | 63.5 | 47.4 | 70.5 | 62.8 | 53.0 | 62.5 | 88.8 | |
| 3: | 31.6 | 6.0 | 43.2 | 18.9 | 44.6 | 18.9 | 30.2 | 23.2 | 35.8 | 15.4 | |

University

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 33.3 | 90.5 | 12.6 | 45.9 | 19.5 | 45.5 | 31.6 | 64.1 | 15.2 | 19.9 | |
| 2: | 51.1 | 10.0 | 51.9 | 63.6 | 39.0 | 74.9 | 71.4 | 55.4 | 70.1 | 93.5 | |
| 3: | 36.4 | 6.5 | 48.9 | 22.9 | 51.5 | 16.0 | 27.7 | 19.5 | 34.2 | 22.1 | |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: | 34.5 | 90.5 | 12.1 | 45.1 | 20.2 | 43.2 | 33.6 | 58.6 | 16.0 | 19.1 | |
| 2: | 50.5 | 7.6 | 53.8 | 63.1 | 43.8 | 71.6 | 65.9 | 52.7 | 65.5 | 90.4 | |
| 3: | 33.6 | 5.9 | 46.2 | 20.6 | 46.9 | 17.3 | 28.6 | 21.2 | 35.1 | 18.4 | |

Table 9.0

9. You are travelling on Highway 401 in the EXPRESS lanes.
You CAN'T SEE any traffic problem ahead.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Use a checkmark (√) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY | CHANGE TO COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP |
|---|---|---|---|
| | % | % | % |
| ACCIDENT 3 KM AHEAD | 22.8 | 73.5 | 38.6 |
| HEAVY CONGESTION AHEAD REDUCE DELAY USE COLLECTOR LANES | 15.6 | 95.2 | 21.7 |
| MAJOR ACCIDENT 3 KM AHEAD. | 25.8 | 80.5 | 31.5 |
| MODERATE CONGESTION AHEAD REDUCE DELAY USE COLLECTOR LANES | 10.0 | 88.5 | 29.1 |
| HEAVY CONGESTION STARTS IN 3 KM | 14.3 | 76.4 | 38.6 |
| CONSTRUCTION STARTS IN 3 KM | 15.6 | 69.0 | 39.1 |
| 2 LEFT LANES BLOCKED 3 KM AHEAD | 16.5 | 80.7 | 34.7 |
| LEFT LANE BLOCKED 3 KM AHEAD | 16.3 | 56.0 | 48.4 |
| EXPRESS LANES CLOSED AHEAD USE COLLECTOR LANES | 11.3 | 96.8 | 15.2 |

## Table 9.0 - Contd.

CMS SURVEY ==========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 9
Percentages.

16 - 25

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 15.8 | 12.5 | 19.7 | 7.2 | 7.9 | 8.6 | 13.2 | 11.8 | 8.6 |
| 2: | 77.0 | 94.7 | 82.9 | 88.8 | 77.6 | 75.0 | 80.3 | 52.0 | 98.7 |
| 3: | 38.8 | 23.7 | 31.6 | 29.6 | 43.4 | 39.5 | 30.9 | 51.3 | 9.2 |

26 - 55

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 24.9 | 16.8 | 26.9 | 10.5 | 15.6 | 17.4 | 16.5 | 17.1 | 11.7 |
| 2: | 74.0 | 95.2 | 81.4 | 88.9 | 76.9 | 68.6 | 81.7 | 57.8 | 96.7 |
| 3: | 38.6 | 22.5 | 31.1 | 29.0 | 38.0 | 38.3 | 36.8 | 47.9 | 18.0 |

>55

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 30.2 | 17.0 | 35.8 | 15.1 | 24.5 | 24.5 | 26.4 | 24.5 | 17.0 |
| 2: | 60.4 | 96.2 | 67.9 | 84.9 | 69.8 | 54.7 | 75.5 | 56.6 | 92.5 |
| 3: | 37.7 | 11.3 | 34.0 | 28.3 | 28.3 | 43.4 | 32.1 | 43.4 | 15.1 |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 22.8 | 15.6 | 25.8 | 10.0 | 14.3 | 15.6 | 16.5 | 16.3 | 11.3 |
| 2: | 73.5 | 95.2 | 80.5 | 88.5 | 76.4 | 69.0 | 80.7 | 56.0 | 96.8 |
| 3: | 38.6 | 21.7 | 31.5 | 29.1 | 38.6 | 39.1 | 34.7 | 48.4 | 15.2 |

## Table 9.1

**CMS SURVEY ======> Report based on 401 EXPERIENCE.**

**Data taken from both types of questionnaire.**
**Question # 9: Percentages**

**Group 1:**

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 21.2 | 12.3 | 24.1 | 10.4 | 12.3 | 15.1 | 15.6 | 14.6 | 10.4 |
| 2: | 78.3 | 95.8 | 83.5 | 87.3 | 77.8 | 73.1 | 82.1 | 54.2 | 97.2 |
| 3: | 36.8 | 25.0 | 28.3 | 28.8 | 39.2 | 34.9 | 33.5 | 47.6 | 16.5 |

**Group 2:**

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 18.5 | 15.4 | 15.4 | 7.7 | 4.6 | 13.8 | 9.2 | 9.2 | 7.7 |
| 2: | 70.8 | 90.8 | 81.5 | 84.6 | 73.8 | 69.2 | 84.6 | 61.5 | 95.4 |
| 3: | 46.2 | 24.6 | 38.5 | 29.2 | 44.6 | 52.3 | 33.8 | 47.7 | 12.3 |

**Group 3:**

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 23.1 | 19.7 | 27.7 | 11.6 | 19.1 | 17.3 | 16.8 | 17.9 | 13.9 |
| 2: | 74.0 | 96.0 | 80.9 | 89.0 | 79.8 | 67.1 | 82.1 | 54.3 | 97.7 |
| 3: | 38.2 | 19.7 | 31.8 | 29.5 | 33.5 | 37.0 | 35.8 | 54.3 | 16.8 |

**Group 4:**

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 29.2 | 15.7 | 33.7 | 7.9 | 16.9 | 14.6 | 23.6 | 22.5 | 11.2 |
| 2: | 62.9 | 95.5 | 71.9 | 93.3 | 68.5 | 62.9 | 71.9 | 59.6 | 95.5 |
| 3: | 38.2 | 15.7 | 33.7 | 29.2 | 42.7 | 43.8 | 36.0 | 39.3 | 11.2 |

**All groups:**

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 22.8 | 15.6 | 25.8 | 10.0 | 14.3 | 15.6 | 16.5 | 16.3 | 11.3 |
| 2: | 73.5 | 95.2 | 80.5 | 88.5 | 76.4 | 69.0 | 80.7 | 56.0 | 96.8 |
| 3: | 38.6 | 21.7 | 31.5 | 29.1 | 38.6 | 39.1 | 34.7 | 48.4 | 15.2 |

## Table 9.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question # 9
Percentages.

Group 1:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 22.6 | 15.4 | 25.4 | 10.3 | 14.0 | 16.0 | 16.4 | 16.0 | 11.0 |
| 2: | 75.2 | 95.6 | 81.8 | 88.2 | 77.4 | 70.4 | 82.2 | 56.1 | 96.7 |
| 3: | 38.8 | 22.4 | 31.4 | 29.8 | 38.2 | 38.4 | 34.2 | 48.2 | 16.7 |

Group 2:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 24.4 | 17.1 | 28.0 | 8.5 | 15.9 | 13.4 | 17.1 | 18.3 | 13.4 |
| 2: | 63.4 | 92.7 | 73.2 | 90.2 | 70.7 | 61.0 | 72.0 | 54.9 | 97.6 |
| 3: | 37.8 | 18.3 | 32.9 | 25.6 | 41.5 | 42.7 | 37.8 | 50.0 | 7.3 |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 22.8 | 15.6 | 25.8 | 10.0 | 14.3 | 15.6 | 16.5 | 16.3 | 11.3 |
| 2: | 73.3 | 95.0 | 80.3 | 88.3 | 76.3 | 68.8 | 80.5 | 55.8 | 96.7 |
| 3: | 38.6 | 21.7 | 31.5 | 29.1 | 38.6 | 39.0 | 34.7 | 48.4 | 15.2 |

## Table 9.3

**CMS SURVEY ======> Report based on EDUCATION GROUPS.**

**Data taken from both types of questionnaire.**

**Question # 9**
**Percentages.**

**Public School**

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 17.4 | 13.0 | 26.1 | 8.7 | 13.0 | 17.4 | 26.1 | 13.0 | 8.7 |
| 2: | 56.5 | 91.3 | 65.2 | 82.6 | 73.9 | 56.5 | 73.9 | 52.2 | 91.3 |
| 3: | 47.8 | 8.7 | 17.4 | 21.7 | 26.1 | 39.1 | 17.4 | 43.5 | 8.7 |

**High School**

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 29.1 | 16.1 | 31.2 | 11.9 | 16.5 | 17.2 | 17.5 | 18.6 | 13.0 |
| 2: | 70.5 | 94.4 | 78.6 | 87.7 | 71.6 | 66.3 | 78.9 | 58.2 | 96.1 |
| 3: | 33.3 | 20.0 | 29.5 | 27.7 | 37.5 | 34.7 | 32.3 | 42.5 | 15.8 |

**University**

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 15.6 | 15.2 | 19.0 | 7.8 | 11.7 | 13.4 | 14.3 | 13.9 | 9.5 |
| 2: | 78.8 | 96.5 | 84.4 | 90.0 | 82.7 | 73.6 | 83.5 | 53.7 | 98.3 |
| 3: | 44.2 | 25.1 | 35.5 | 31.6 | 41.1 | 44.6 | 39.4 | 56.3 | 15.2 |

**All groups:**

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 22.8 | 15.6 | 25.8 | 10.0 | 14.3 | 15.6 | 16.5 | 16.3 | 11.3 |
| 2: | 73.5 | 95.2 | 80.5 | 88.5 | 76.4 | 69.0 | 80.7 | 56.0 | 96.8 |
| 3: | 38.6 | 21.7 | 31.5 | 29.1 | 38.6 | 39.1 | 34.7 | 48.4 | 15.2 |

## Table 10.0

10. You are travelling on Highway 401 in RUSH HOUR. Traffic is congested as it usually is in rush hour. Rank the following sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

NORMAL CONGESTION AHEAD NEXT 5 KM 17.5 %

RUSH HOUR CONDITIONS AHEAD NEXT 5 KM 65.8 %

no message (blank sign) 5.4 %

time and/or weather messages (eg TIME 4:31 - CLOUDY) 11.3 %

CMS SURVEY ==========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question #10
Number of people ranking each message as 1

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 18 (11.8%) | 65 (19.5%) | 11 (20.8%) | 94 (17.5%) |
| M2. | 111 (73.0%) | 209 (62.8%) | 34 (64.2%) | 354 (65.8%) |
| M3. | 1 ( 0.7%) | 24 ( 7.2%) | 4 ( 7.5%) | 29 ( 5.4%) |
| M4. | 22 (14.5%) | 35 (10.5%) | 4 ( 7.5%) | 61 (11.3%) |

Question #10
Number of people ranking each message as 4

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 16 (10.5%) | 15 ( 4.5%) | 1 ( 1.9%) | 32 ( 5.9%) |
| M2. | 2 ( 1.3%) | 17 ( 5.1%) | 1 ( 1.9%) | 20 ( 3.7%) |
| M3. | 114 (75.0%) | 215 (64.6%) | 40 (75.5%) | 369 (68.6%) |
| M4. | 20 (13.2%) | 86 (25.8%) | 11 (20.8%) | 117 (21.7%) |

## Table 10.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question #10
Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 38 (18.0%) | 13 (20.0%) | 25 (14.5%) | 18 (20.2%) | 94 (17.5%) |
| M2. | 136 (64.5%) | 42 (64.6%) | 117 (67.6%) | 59 (66.3%) | 354 (65.8%) |
| M3. | 12 ( 5.7%) | 2 ( 3.1%) | 13 ( 7.5%) | 2 ( 2.2%) | 29 ( 5.4%) |
| M4. | 25 (11.8%) | 8 (12.3%) | 18 (10.4%) | 10 (11.2%) | 61 (11.3%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question #10
Number of people ranking each message as 4

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 12 ( 5.7%) | 4 ( 6.2%) | 12 ( 6.9%) | 4 ( 4.5%) | 32 ( 5.9%) |
| M2. | 5 ( 2.4%) | 4 ( 6.2%) | 10 ( 5.8%) | 1 ( 1.1%) | 20 ( 3.7%) |
| M3. | 147 (69.7%) | 44 (67.7%) | 114 (65.9%) | 64 (71.9%) | 369 (68.6%) |
| M4. | 47 (22.3%) | 13 (20.0%) | 37 (21.4%) | 20 (22.5%) | 117 (21.7%) |

## Table 10.2

**CMS SURVEY ======> Report based on DRIVING EXPOSURE.**

**Data taken from both types of questionnaire.**

**Question #10**
**Number of people ranking each message as 1**

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 82 (18.0%) | 11 (13.4%) | 93 (17.3%) |
| M2. | 297 (65.3%) | 57 (69.5%) | 354 (65.9%) |
| M3. | 23 ( 5.1%) | 6 ( 7.3%) | 29 ( 5.4%) |
| M4. | 53 (11.6%) | 8 ( 9.8%) | 61 (11.4%) |

**CMS SURVEY ======> Report based on DRIVING EXPOSURE.**

**Data taken from both types of questionnaire.**

**Question #10**
**Number of people ranking each message as 4**

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 27 ( 5.9%) | 5 ( 6.1%) | 32 ( 6.0%) |
| M2. | 18 ( 4.0%) | 2 ( 2.4%) | 20 ( 3.7%) |
| M3. | 307 (67.5%) | 61 (74.4%) | 368 (68.5%) |
| M4. | 103 (22.6%) | 14 (17.1%) | 117 (21.8%) |

## Table 10.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question #10
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 7 (30.4%) | 48 (16.9%) | 39 (16.9%) | 94 (17.5%) |
| M2. | 10 (43.5%) | 194 (68.3%) | 150 (64.9%) | 354 (65.8%) |
| M3. | 1 ( 4.3%) | 14 ( 4.9%) | 14 ( 6.1%) | 29 ( 5.4%) |
| M4. | 5 (21.7%) | 28 ( 9.9%) | 28 (12.1%) | 61 (11.3%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question #10
Number of people ranking each message as 4

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 4 (17.4%) | 18 ( 6.3%) | 10 ( 4.3%) | 32 ( 5.9%) |
| M2. | 0 ( 0.0%) | 7 ( 2.5%) | 13 ( 5.6%) | 20 ( 3.7%) |
| M3. | 16 (69.6%) | 199 (70.1%) | 154 (66.7%) | 369 (68.6%) |
| M4. | 3 (13.0%) | 60 (21.1%) | 54 (23.4%) | 117 (21.7%) |

**Table 11.0**

11. You are travelling on Highway 401. Traffic is FLOWING FREELY. Rank the following messages, with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | |
|---|---|
| NORMAL TRAFFIC<br>NEXT 5 KM | 47.9 % |
| no message (blank sign) | 13.0 % |
| Messages giving directions which are also given on nearby signs (eg AVENUE ROAD EXIT 1 KM) | 25.7 % |
| time and/or weather messages (eg TIME 4:31 - CLOUDY) | 13.4 % |

CMS SURVEY ===========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question #11
Number of people ranking each message as 1

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 61 (40.1%) | 173 (52.0%) | 23 (44.2%) | 257 (47.9%) |
| M2. | 12 ( 7.9%) | 43 (12.9%) | 15 (28.8%) | 70 (13.0%) |
| M3. | 47 (30.9%) | 79 (23.7%) | 12 (23.1%) | 138 (25.7%) |
| M4. | 32 (21.1%) | 38 (11.4%) | 2 ( 3.8%) | 72 (13.4%) |

Question #11
Number of people ranking each message as 4

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| M1. | 21 (13.8%) | 23 ( 6.9%) | 3 ( 5.8%) | 47 ( 8.8%) |
| M2. | 109 (71.7%) | 188 (56.5%) | 26 (50.0%) | 323 (60.1%) |
| M3. | 7 ( 4.6%) | 27 ( 8.1%) | 2 ( 3.8%) | 36 ( 6.7%) |
| M4. | 15 ( 9.9%) | 95 (28.5%) | 21 (40.4%) | 131 (24.4%) |

## Table 11.1

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question #11
Number of people ranking each message as 1

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 108 (51.2%) | 32 (49.2%) | 68 (39.3%) | 49 (55.7%) | 257 (47.9%) |
| M2. | 23 (10.9%) | 9 (13.8%) | 28 (16.2%) | 10 (11.4%) | 70 (13.0%) |
| M3. | 50 (23.7%) | 14 (21.5%) | 55 (31.8%) | 19 (21.6%) | 138 (25.7%) |
| M4. | 30 (14.2%) | 10 (15.4%) | 22 (12.7%) | 10 (11.4%) | 72 (13.4%) |

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question #11
Number of people ranking each message as 4

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| M1. | 15 ( 7.1%) | 6 ( 9.2%) | 20 (11.6%) | 6 ( 6.8%) | 47 ( 8.8%) |
| M2. | 131 (62.1%) | 42 (64.6%) | 96 (55.5%) | 54 (61.4%) | 323 (60.1%) |
| M3. | 12 ( 5.7%) | 5 ( 7.7%) | 15 ( 8.7%) | 4 ( 4.5%) | 36 ( 6.7%) |
| M4. | 53 (25.1%) | 12 (18.5%) | 42 (24.3%) | 24 (27.3%) | 131 (24.4%) |

## Table 11.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire

Question #11
Number of people ranking each message as 1

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 222 (48.9%) | 34 (41.5%) | 256 (47.8%) |
| M2. | 60 (13.2%) | 10 (12.2%) | 70 (13.1%) |
| M3. | 111 (24.4%) | 27 (32.9%) | 138 (25.7%) |
| M4. | 61 (13.4%) | 11 (13.4%) | 72 (13.4%) |

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question #11
Number of people ranking each message as 4

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| M1. | 39 ( 8.6%) | 8 ( 9.8%) | 47 ( 8.8%) |
| M2. | 269 (59.3%) | 53 (64.6%) | 322 (60.1%) |
| M3. | 32 ( 7.0%) | 4 ( 4.9%) | 36 ( 6.7%) |
| M4. | 114 (25.1%) | 17 (20.7%) | 131 (24.4%) |

## Table 11.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question #11
Number of people ranking each message as 1

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 9 (39.1%) | 146 (51.6%) | 102 (44.2%) | 257 (47.9%) |
| M2. | 4 (17.4%) | 29 (10.2%) | 37 (16.0%) | 70 (13.0%) |
| M3. | 6 (26.1%) | 71 (25.1%) | 61 (26.4%) | 138 (25.7%) |
| M4. | 4 (17.4%) | 37 (13.1%) | 31 (13.4%) | 72 (13.4%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question #11
Number of people ranking each message as 4

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| M1. | 2 ( 8.7%) | 21 ( 7.4%) | 24 (10.4%) | 47 ( 8.8%) |
| M2. | 15 (65.2%) | 178 (62.9%) | 130 (56.3%) | 323 (60.1%) |
| M3. | 1 ( 4.3%) | 17 ( 6.0%) | 18 ( 7.8%) | 36 ( 6.7%) |
| M4. | 5 (21.7%) | 67 (23.7%) | 59 (25.5%) | 131 (24.4%) |

**Table 12.0**

12. You are travelling on Highway 401 in the COLLECTOR lanes.
You are planning to EXIT in 6 km, which is 3 exits beyond where you are now.

You see the following messages on a traffic sign above the roadway. Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE IN THE COLLECTOR LANES | SLOW DOWN IMMEDIATELY % | LEAVE HIGHWAY AT NEXT EXIT % | SLOW DOWN WHEN I SEE TRAFFIC BACKUP % | CHANGE TO EXPRESS LANES % |
|---|---|---|---|---|
| MODERATE CONGESTION CLEARS IN 10 KM | 11.9 | 20.2 | 59.2 | 21.5 |
| SPEED 20-40 KM/H NEXT 3 KM | 31.9 | 20.4 | 43.4 | 17.1 |
| SPEED 20-40 KM/H NEXT 10 KM | 27.3 | 34.5 | 33.4 | 24.7 |
| HEAVY CONGESTION STARTS IN 1 KM | 28.9 | 48.1 | 23.9 | 23.4 |
| CONSTRUCTION STARTS IN 1 KM REDUCE SPEED | 46.2 | 25.8 | 29.3 | 22.8 |
| HEAVY CONGESTION CLEARS IN 10 KM | 13.0 | 44.9 | 34.7 | 25.4 |
| LEFT LANE BLOCKED 1 KM AHEAD | 25.4 | 17.4 | 49.2 | 21.0 |
| COLLECTORS CLOSED AHEAD THROUGH TRAFFIC USE EXPRESS LANES | 7.4 | 44.2 | 11.7 | 52.7 |
| MINOR CONGESTION CLEARS IN 10 KM | 13.5 | 20.4 | 59.2 | 20.2 |

**Table 12.0 - Contd.**

CMS SURVEY ==========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.
Question #12: Percentages.

16 - 25

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 5.3 | 27.6 | 21.7 | 23.7 | 34.2 | 5.9 | 15.8 | 3.9 | 7.9 |
| 2: | 22.4 | 21.7 | 41.4 | 55.9 | 32.9 | 54.6 | 18.4 | 47.4 | 23.7 |
| 3: | 63.8 | 42.8 | 30.3 | 22.4 | 33.6 | 34.2 | 54.6 | 8.6 | 59.2 |
| 4: | 22.4 | 19.7 | 26.3 | 21.7 | 26.3 | 21.1 | 19.1 | 49.3 | 21.7 |

26 - 55

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 12.9 | 30.5 | 28.7 | 30.2 | 49.4 | 15.9 | 26.3 | 8.7 | 14.4 |
| 2: | 20.1 | 21.0 | 33.2 | 46.4 | 24.3 | 41.6 | 16.8 | 44.3 | 19.5 |
| 3: | 58.7 | 46.1 | 35.0 | 24.9 | 29.3 | 35.9 | 50.0 | 13.8 | 60.5 |
| 4: | 22.2 | 17.4 | 24.6 | 24.3 | 21.9 | 26.6 | 22.2 | 53.0 | 19.5 |

>55

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 24.5 | 52.8 | 34.0 | 35.8 | 60.4 | 15.1 | 47.2 | 9.4 | 24.5 |
| 2: | 15.1 | 13.2 | 22.6 | 35.8 | 15.1 | 37.7 | 18.9 | 34.0 | 17.0 |
| 3: | 49.1 | 28.3 | 32.1 | 22.6 | 17.0 | 28.3 | 28.3 | 7.5 | 50.9 |
| 4: | 15.1 | 7.5 | 20.8 | 22.6 | 18.9 | 30.2 | 18.9 | 60.4 | 20.8 |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.9 | 31.9 | 27.3 | 28.9 | 46.2 | 13.0 | 25.4 | 7.4 | 13.5 |
| 2: | 20.2 | 20.4 | 34.5 | 48.1 | 25.8 | 44.9 | 17.4 | 44.2 | 20.4 |
| 3: | 59.2 | 43.4 | 33.4 | 23.9 | 29.3 | 34.7 | 49.2 | 11.7 | 59.2 |
| 4: | 21.5 | 17.1 | 24.7 | 23.4 | 22.8 | 25.4 | 21.0 | 52.7 | 20.2 |

## Table 12.1

CMS SURVEY =====> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire. Question #12: Percentages.

Group 1:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 10.4 | 27.4 | 21.2 | 25.0 | 41.5 | 11.3 | 22.6 | 6.1 | 10.8 |
| 2: | 19.3 | 19.8 | 37.3 | 47.2 | 25.0 | 42.5 | 17.9 | 44.3 | 20.8 |
| 3: | 59.9 | 47.6 | 35.4 | 26.4 | 32.1 | 32.1 | 50.5 | 12.3 | 58.5 |
| 4: | 22.6 | 17.5 | 25.9 | 25.5 | 25.9 | 31.6 | 22.2 | 53.8 | 22.6 |

Group 2:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 10.8 | 32.3 | 30.8 | 26.2 | 47.7 | 7.7 | 23.1 | 9.2 | 9.2 |
| 2: | 20.0 | 26.2 | 41.5 | 47.7 | 27.7 | 43.1 | 20.0 | 43.1 | 29.2 |
| 3: | 61.5 | 36.9 | 27.7 | 30.8 | 30.8 | 49.2 | 49.2 | 15.4 | 52.3 |
| 4: | 29.2 | 26.2 | 27.7 | 26.2 | 29.2 | 23.1 | 24.6 | 56.9 | 24.6 |

Group 3:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 13.9 | 35.3 | 33.5 | 30.1 | 45.7 | 15.0 | 26.0 | 8.7 | 16.2 |
| 2: | 22.5 | 20.8 | 32.9 | 53.2 | 30.1 | 52.0 | 19.1 | 48.6 | 19.7 |
| 3: | 60.1 | 43.9 | 32.9 | 23.1 | 30.1 | 31.8 | 50.9 | 9.8 | 64.2 |
| 4: | 17.3 | 13.9 | 22.5 | 18.5 | 17.9 | 20.8 | 17.9 | 48.6 | 16.8 |

Group 4:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 12.4 | 36.0 | 27.0 | 38.2 | 57.3 | 16.9 | 32.6 | 6.7 | 18.0 |
| 2: | 18.0 | 16.9 | 25.8 | 40.4 | 18.0 | 38.2 | 11.2 | 36.0 | 14.6 |
| 3: | 53.9 | 37.1 | 33.7 | 14.6 | 20.2 | 36.0 | 42.7 | 11.2 | 56.2 |
| 4: | 21.3 | 15.7 | 23.6 | 25.8 | 20.2 | 21.3 | 21.3 | 55.1 | 18.0 |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.9 | 31.9 | 27.3 | 28.9 | 46.2 | 13.0 | 25.4 | 7.4 | 13.5 |
| 2: | 20.2 | 20.4 | 34.5 | 48.1 | 25.8 | 44.9 | 17.4 | 44.2 | 20.4 |
| 3: | 59.2 | 43.4 | 33.4 | 23.9 | 29.3 | 34.7 | 49.2 | 11.7 | 59.2 |
| 4: | 21.5 | 17.1 | 24.7 | 23.4 | 22.8 | 25.4 | 21.0 | 52.7 | 20.2 |

## Table 12.2

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question #12
Percentages.

Group 1:

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.8 | 31.1 | 27.6 | 27.9 | 46.1 | 11.8 | 24.3 | 7.7 | 13.2 |
| 2: | 21.1 | 20.4 | 34.9 | 48.5 | 25.2 | 45.0 | 17.5 | 45.6 | 20.4 |
| 3: | 59.9 | 44.3 | 33.3 | 25.9 | 31.1 | 35.7 | 50.2 | 12.3 | 59.2 |
| 4: | 21.9 | 18.0 | 25.7 | 23.9 | 23.2 | 27.4 | 21.5 | 51.5 | 21.3 |

Group 2:

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 12.2 | 35.4 | 24.4 | 34.1 | 46.3 | 18.3 | 30.5 | 6.1 | 14.6 |
| 2: | 15.9 | 20.7 | 32.9 | 46.3 | 29.3 | 45.1 | 17.1 | 35.4 | 20.7 |
| 3: | 54.9 | 39.0 | 34.1 | 13.4 | 19.5 | 29.3 | 43.9 | 8.5 | 59.8 |
| 4: | 19.5 | 12.2 | 19.5 | 20.7 | 20.7 | 14.6 | 18.3 | 59.8 | 14.6 |

All groups:

|  | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.9 | 31.7 | 27.1 | 28.8 | 46.0 | 12.8 | 25.2 | 7.4 | 13.4 |
| 2: | 20.2 | 20.4 | 34.5 | 48.1 | 25.8 | 44.9 | 17.4 | 44.0 | 20.4 |
| 3: | 59.0 | 43.4 | 33.4 | 23.9 | 29.3 | 34.7 | 49.2 | 11.7 | 59.2 |
| 4: | 21.5 | 17.1 | 24.7 | 23.4 | 22.8 | 25.4 | 21.0 | 52.7 | 20.2 |

## Table 12.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.
Question #12: Percentages.

Public School

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 21.7 | 39.1 | 13.0 | 26.1 | 56.5 | 0.0 | 34.8 | 4.3 | 8.7 |
| 2: | 43.5 | 26.1 | 34.8 | 39.1 | 26.1 | 52.2 | 21.7 | 43.5 | 34.8 |
| 3: | 39.1 | 30.4 | 34.8 | 26.1 | 13.0 | 30.4 | 34.8 | 4.3 | 43.5 |
| 4: | 4.3 | 8.7 | 21.7 | 17.4 | 13.0 | 21.7 | 21.7 | 52.2 | 21.7 |

High School

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.2 | 31.2 | 28.4 | 29.8 | 44.6 | 14.7 | 26.0 | 8.1 | 14.7 |
| 2: | 20.0 | 22.5 | 35.4 | 48.1 | 23.9 | 44.6 | 17.2 | 44.9 | 23.2 |
| 3: | 56.1 | 39.6 | 24.9 | 21.4 | 26.3 | 32.6 | 46.3 | 12.3 | 53.3 |
| 4: | 21.4 | 16.1 | 25.6 | 21.1 | 23.9 | 23.5 | 20.7 | 50.9 | 21.4 |

University

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.7 | 32.0 | 27.3 | 28.1 | 47.2 | 12.1 | 23.8 | 6.9 | 12.6 |
| 2: | 18.2 | 17.3 | 33.3 | 48.9 | 28.1 | 44.6 | 17.3 | 43.3 | 15.6 |
| 3: | 64.9 | 49.4 | 43.7 | 26.8 | 34.6 | 37.7 | 54.1 | 11.7 | 68.0 |
| 4: | 23.4 | 19.0 | 23.8 | 26.8 | 22.5 | 28.1 | 21.2 | 55.0 | 18.6 |

All groups:

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
|---|---|---|---|---|---|---|---|---|---|
| 1: | 11.9 | 31.9 | 27.3 | 28.9 | 46.2 | 13.0 | 25.4 | 7.4 | 13.5 |
| 2: | 20.2 | 20.4 | 34.5 | 48.1 | 25.8 | 44.9 | 17.4 | 44.2 | 20.4 |
| 3: | 59.2 | 43.4 | 33.4 | 23.9 | 29.3 | 34.7 | 49.2 | 11.7 | 59.2 |
| 4: | 21.5 | 17.1 | 24.7 | 23.4 | 22.8 | 25.4 | 21.0 | 52.7 | 20.2 |

## Table 13.0

13. What does this sign message mean to you? Please circle the number of your answer.

**SPEED 30-40 KM/H**
**NEXT 3 KM**

| | | |
|---|---|---|
| 1. | The legal speed limit is 40 km/h for the next 3 km. | 17.5% |
| 2. | The average speed of the traffic is between 30 and 40 km/h for the next 3 km. | 42.4% |
| 3. | The recommended speed is 30 to 40 km/h for the next 3 km. | 38.7% |
| 4. | Don't know. | 1.5% |

CMS SURVEY ===========> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question # 13
Totals for each response.

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| 1. | 18 (11.8%) | 54 (16.2%) | 22 (42.3%) | 94 (17.5%) |
| 2. | 79 (52.0%) | 140 (41.9%) | 9 (17.3%) | 228 (42.4%) |
| 3. | 55 (36.2%) | 132 (39.5%) | 21 (40.4%) | 208 (38.7%) |
| 4. | 0 ( 0.0%) | 8 ( 2.4%) | 0 ( 0.0%) | 8 ( 1.5%) |

## Tables 13.1, 13.2

CMS SURVEY ======> Report based on 401 EXPERIENCE.

Data taken from both types of questionnaire.

Question #13
Totals for each response.

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| 1. | 32 (15.1%) | 9 (13.8%) | 29 (16.8%) | 24 (27.3%) | 94 (17.5%) |
| 2. | 95 (44.8%) | 33 (50.8%) | 75 (43.4%) | 25 (28.4%) | 228 (42.4%) |
| 3. | 84 (39.6%) | 22 (33.8%) | 66 (38.2%) | 36 (40.9%) | 208 (38.7%) |
| 4. | 1 ( 0.5%) | 1 ( 1.5%) | 3 ( 1.7%) | 3 ( 3.4%) | 8 ( 1.5%) |

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question #13
Totals for each response.

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| 1. | 75 (16.5%) | 19 (23.2%) | 94 (17.5%) |
| 2. | 201 (44.2%) | 26 (31.7%) | 227 (42.3%) |
| 3. | 173 (38.0%) | 35 (42.7%) | 208 (38.7%) |
| 4. | 6 ( 1.3%) | 2 ( 2.4%) | 8 ( 1.5%) |

## Table 13.3

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question #13
Totals for each response.

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| 1. | 8 (34.8%) | 58 (20.4%) | 28 (12.1%) | 94 (17.5%) |
| 2. | 5 (21.7%) | 114 (40.1%) | 109 (47.2%) | 228 (42.4%) |
| 3. | 9 (39.1%) | 108 (38.0%) | 91 (39.4%) | 208 (38.7%) |
| 4. | 1 ( 4.3%) | 4 ( 1.4%) | 3 ( 1.3%) | 8 ( 1.5%) |

## Tables 14.0,14.1

14. What does this sign message mean to you? Please circle the number of your answer.

**HEAVY CONGESTION**
**NEXT 3 KM**

| | | |
|---|---|---|
| 1. | Heavy congestion starts in 3 km. | 26.8% |
| 2. | Heavy congestion ends in 3 km. | 70.1% |
| 3. | Don't know. | 3.2% |

CMS SURVEY ===============> Report based on AGE GROUPS.

Data taken from both types of questionnaire.

Question #14
Totals for each response.

| | 16 - 25 | 26 - 55 | > 55 | Totals |
|---|---|---|---|---|
| 1. | 41 (27.0%) | 88 (26.3%) | 15 (28.8%) | 144 (26.8%) |
| 2. | 108 (71.1%) | 234 (70.1%) | 35 (67.3%) | 377 (70.1%) |
| 3. | 3 ( 2.0%) | 12 ( 3.6%) | 2 ( 3.8%) | 17 (3.2%) |

CMS SURVEY ===============> Report based on 401 EXPERIENCE

Question #14
Totals for each response.

| | Group 1 | Group 2 | Group 3 | Group 4 | Totals |
|---|---|---|---|---|---|
| 1. | 58 (27.4%) | 22 (33.8%) | 37 (21.4%) | 27 (30.7%) | 144 (26.8%) |
| 2. | 152 (71.7%) | 37 (56.9%) | 130 (75.1%) | 58 (65.9%) | 377 (70.1%) |
| 3. | 2 ( 0.9%) | 6 ( 9.2%) | 6 ( 3.5%) | 3 ( 3.4%) | 17 ( 3.2%) |

## Tables 14.2, 14.3

CMS SURVEY ======> Report based on DRIVING EXPOSURE.

Data taken from both types of questionnaire.

Question #14
Totals for each response.

| | Group 1 | Group 2 | Totals |
|---|---|---|---|
| 1. | 115 (25.3%) | 29 (35.4%) | 144 (26.8%) |
| 2. | 325 (71.4%) | 51 (62.2%) | 376 (70.0%) |
| 3. | 15 ( 3.3%) | 2 ( 2.4%) | 17 ( 3.2%) |

CMS SURVEY ======> Report based on EDUCATION GROUPS.

Data taken from both types of questionnaire.

Question #14
Totals for each response.

| | Pub. Sch. | High Sch. | University | Totals |
|---|---|---|---|---|
| 1. | 7 (30.4%) | 90 (31.7%) | 47 (20.3%) | 144 (26.8%) |
| 2. | 14 (60.9%) | 185 (65.1%) | 178 (77.1%) | 377 (70.1%) |
| 3. | 2 ( 8.7%) | 9 ( 3.2%) | 6 ( 2.6%) | 17 ( 3.2%) |

# APPENDIX B4

## Non-English-Speakers Survey Results

## TABLE 15: ITALIAN-SPEAKERS SURVEY DEMOGRAPHICS

Total participants - 40

Age 16-25 ( 4 ) 10.0 %

| Male ( 4 ) 100 % | Female ( 0 ) 0.0 % | Total ( 4 ) |
|---|---|---|
| PS ( 1 ) 25.0 % | PS ( 0 ) -- % | PS ( 1 ) 25.0 % |
| HS ( 3 ) 75.0 % | HS ( 0 ) -- % | HS ( 3 ) 75.0 % |
| U ( 0 ) 0.0 % | U ( 0 ) -- % | U ( 0 ) 0.0 % |

Age 26-55 ( 32 ) 80.0 %

| Male ( 18 ) 56.2 % | Female ( 14 ) 43.8 % | Total ( 32 ) |
|---|---|---|
| PS ( 9 ) 50.0 % | PS ( 4 ) 28.6 % | PS ( 13 ) 40.6 % |
| HS ( 4 ) 22.2 % | HS ( 7 ) 50.0 % | HS ( 11 ) 34.4 % |
| U ( 5 ) 27.8 % | U ( 3 ) 21.4 % | U ( 8 ) 25.0 % |

Age >55 ( 4 ) 10.0 %

| Male ( 2 ) 50.0 % | Female ( 2 ) 50.0 % | Total ( 4 ) |
|---|---|---|
| PS ( 1 ) 50.0 % | PS ( 1 ) 50.0 % | PS ( 2 ) 50.0 % |
| HS ( 0 ) 0.0 % | HS ( 1 ) 50.0 % | HS ( 1 ) 25.0 % |
| U ( 1 ) 50.0 % | U ( 0 ) 0.0 % | U ( 1 ) 25.0 % |

All Ages ( 40 )

| Male ( 24 ) 60.0 % | Female ( 16 ) 40.0 % | Totals 40 |
|---|---|---|
| PS ( 11 ) 45.8 % | PS ( 5 ) 31.2 % | PS ( 16 ) 40.0 % |
| HS ( 7 ) 29.2 % | HS ( 8 ) 50.0 % | HS ( 15 ) 37.5 % |
| U ( 6 ) 25.0 % | U ( 3 ) 18.8 % | U ( 9 ) 22.5 % |

## TABLE 16: ITALIAN-SPEAKERS SURVEY RESULTS

Please check appropriate space

Sex: Male 24
Female 16

Age: 16-25 4
26-55 32
over 55 4

Level of Education: Grade 1-8 16
Grade 9-13 15
University or Post Secondary 9

FOR ALL THE FOLLOWING QUESTIONS PLEASE IMAGINE YOU ARE TRAVELLING ON HIGHWAY 401 AND YOU SEE A SIGN ABOVE THE ROADWAY WITH A MESSAGE ON IT.

1. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving very slowly (stop and go). Please rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred. down to 3 for least preferred. Even if 2 of the choices seem equal please decide between them and do not give them the same ranking.

| | | (X) |
|---|---|---|
| SEVERE TRAFFIC DELAY STARTS IN 1 KM | 25.0% | 2.5% |
| HEAVY CONGESTION STARTS IN 1 KM | 52.5% | 2.5% |
| TRAFFIC JAM STARTS IN 1 KM | 22.5% | 5.0% |

2. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving somewhat slowly (slow moving with occasional stops). Please rank the following traffic sign messages, with 1 for most preferred, 2 for next most preferred, and 3 for least preferred.

| | | (X) |
|---|---|---|
| MODERATE CONGESTION STARTS IN 1 KM | 30.0% | 2.5% |
| TRAFFIC DELAY STARTS IN 1 KM | 15.0% | 2.5% |
| TRAFFIC SLOWDOWN STARTS IN 1 KM | 55.0% | 5.0% |

3. How far in advance of the start of unusual congestion do you think information about the delay should be given to drivers?
Please circle the number of your answer.

| | | |
|---|---|---|
| 1. | less than 2 km. (about 1 mile) | 12.5 % |
| 2. | 2 to 3 km. (about 1-2 miles) | 17.5 % |
| 3. | 4 to 5 km. (about 2 1/2 to 3 miles) | 20.0 % |
| 4. | 6 to 8 km. (about 4 - 5 miles) | 30.0 % |
| 5. | more than 8 km (more than 5 miles) | 20.0 % |

4. Imagine there is a MAJOR ACCIDENT ahead.

Which of the messages below would you prefer? Rank these messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

| | | (X) |
|---|---|---|
| MAJOR ACCIDENT AHEAD<br>1 KM BEFORE AVENUE ROAD | 35.0 % | 2.5 % |
| MAJOR ACCIDENT AHEAD<br>20 MINUTE DELAY | 7.5 % | 2.5 % |
| MAJOR ACCIDENT AHEAD<br>LEFT 2 LANES BLOCKED | 30.0 % | 2.5 % |
| MAJOR ACCIDENT AHEAD<br>CONGESTION FOR 5 KM | 27.5 % | 0 |

5. The traffic is STOP AND GO ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc, down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| DELAY 3 TO 7 MIN.<br>NEXT 3 KM. | 10.0 % | 2.5 % |
| SPEED 20-40 KM/H.<br>NEXT 3 KM. | 37.5 % | 0 |
| HEAVY CONGESTION<br>NEXT 3 KM. | 45.0 % | 2.5 % |
| TRAVEL TIME 5-9 MIN.<br>NEXT 3 KM. | 7.5 % | 2.5 % |

6. The traffic is MOVING SLOWLY WITH OCCASIONAL STOPS ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| DELAY 1 TO 3 MIN.<br>NEXT 3 KM. | 5.0 % | 2.5 % |
| SPEED 40-60 KM/H.<br>NEXT 3 KM. | 37.5 % | 0 |
| MODERATE CONGESTION<br>NEXT 3 KM. | 42.5 % | 2.5 % |
| TRAVEL TIME 3-5 MIN.<br>NEXT 3 KM. | 15.0 % | 2.5 % |

7. Traffic is SLOW BUT KEEPS MOVING. Rank the following traffic sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| DELAY UP TO 1 MIN<br>NEXT 3 KM | 2.5 % | 2.5 % |
| SPEED 60-80 KM/H<br>NEXT 3 KM | 42.5 % | 0 |
| MINOR CONGESTION<br>NEXT 3 KM | 42.5 % | 2.5 % |
| TRAVEL TIME 2-3 MIN<br>NEXT 3 KM | 12.5 % | 2.5 % |

8. You are travelling on Highway 401 in the EXPRESS lanes.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY | TAKE COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP | (X |
|---|---|---|---|---|
| SPEED 40-60 KM/H NEXT 10 KM | 5.0 | 57.5 | 52.5 | 0 |
| ICY CONDITIONS AHEAD | 74.4 | 33.3 | 20.5 | 2.5 |
| MODERATE CONGESTION CLEARS IN 10 KM | 7.7 | 56.4 | 53.8 | 2. |
| ACCIDENT 1 KM AHEAD | 38.5 | 56.4 | 28.2 | 2. |
| HEAVY CONGESTION CLEARS IN 3 KM | 7.7 | 46.2 | 51.3 | 2. |
| MAJOR ACCIDENT 1 KM AHEAD | 37.5 | 77.5 | 25.0 | 0 |
| HEAVY CONGESTION STARTS IN 1 KM | 25.0 | 67.5 | 37.5 | 0 |
| HEAVY CONGESTION STARTS IN 1 KM REDUCE SPEED | 35.0 | 62.5 | 35.0 | 0 |
| HEAVY CONGESTION CLEARS IN 10 KM | 7.7 | 61.5 | 46.2 | 2 |
| SPEED 40-60 KM/H AHEAD REDUCE DELAY USE COLLECTOR LANES | 5.0 | 92.5 | 25.0 | 0 |

9. You are travelling on Highway 401 in the EXPRESS lanes.
You CAN'T SEE any traffic problem ahead.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Use a checkmark (√) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | (X%) | SLOW DOWN IMMEDIATELY | CHANGE TO COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP |
|---|---|---|---|---|
| ACCIDENT<br>3 KM AHEAD | 0 | 17.5 | 75.0 | 37.5 |
| HEAVY CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 0 | 27.5 | 82.5 | 27.5 |
| MAJOR ACCIDENT<br>3 KM AHEAD. | 0 | 20.0 | 72.5 | 42.5 |
| MODERATE CONGESTION AHEAD<br>REDUCE DELAY<br>USE COLLECTOR LANES | 0 | 5.0 | 82.5 | 35.0 |
| HEAVY CONGESTION<br>STARTS IN 3 KM | 0 | 10.0 | 75.0 | 42.5 |
| CONSTRUCTION<br>STARTS IN 3 KM | 0 | 12.5 | 72.5 | 40.0 |
| 2 LEFT LANES BLOCKED<br>3 KM AHEAD | 0 | 12.5 | 75.0 | 35.0 |
| LEFT LANE BLOCKED<br>3 KM AHEAD | 0 | 15.0 | 72.5 | 35.0 |
| EXPRESS LANES<br>CLOSED AHEAD<br>USE COLLECTOR LANES | 0 | 7.5 | 95.0 | 22.5 |

10. You are travelling on Highway 401 in RUSH HOUR. Traffic is congested as it usually is in rush hour. Rank the following sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X%) |
|---|---|---|
| NORMAL CONGESTION AHEAD NEXT 5 KM | 17.5 % | 0 |
| RUSH HOUR CONDITIONS AHEAD NEXT 5 KM | 72.5 % | 0 |
| no message (blank sign) | 10.0 % | 0 |
| time and/or weather messages (eg TIME 4:31 - CLOUDY) | 0 | 0 |

11. You are travelling on Highway 401. Traffic is FLOWING FREELY. Rank the following messages, with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | |
|---|---|---|
| NORMAL TRAFFIC NEXT 5 KM | 47.5 % | 0 |
| no message (blank sign) | 20.0 % | 0 |
| Messages giving directions which are also given on nearby signs (eg AVENUE ROAD EXIT 1 KM) | 25.0 % | 0 |
| time and/or weather messages (eg TIME 4:31 - CLOUDY) | 7.5 % | 0 |

12. You are travelling on Highway 401 in the COLLECTOR lanes.
You are planning to EXIT in 6 km, which is 3 exits beyond where you are now.

You see the following messages on a traffic sign above the roadway. Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE IN THE COLLECTOR LANES | (X%) | SLOW DOWN IMMEDIATELY | LEAVE HIGHWAY AT NEXT EXIT | SLOW DOWN WHEN I SEE TRAFFIC BACKUP | CHANGE TO EXPRESS LANES |
|---|---|---|---|---|---|
| MODERATE CONGESTION CLEARS IN 10 KM | 2.5 | 10.3 | 33.3 | 46.2 | 35.9 |
| SPEED 20-40 KM/H NEXT 3 KM | 0 | 15.0 | 42.5 | 45.0 | 27.5 |
| SPEED 20-40 KM/H NEXT 10 KM | 0 | 12.5 | 65.0 | 20.0 | 37.5 |
| HEAVY CONGESTION STARTS IN 1 KM | 0 | 15.0 | 77.5 | 15.0 | 25.0 |
| CONSTRUCTION STARTS IN 1 KM REDUCE SPEED | 0 | 30.0 | 52.5 | 30.0 | 22.5 |
| HEAVY CONGESTION CLEARS IN 10 KM | 0 | 5.0 | 60.0 | 32.5 | 32.5 |
| LEFT LANE BLOCKED 1 KM AHEAD | 0 | 17.5 | 20.0 | 42.5 | 40.0 |
| COLLECTORS CLOSED AHEAD THROUGH TRAFFIC USE EXPRESS LANES | 0 | 7.5 | 42.5 | 10.0 | 57.5 |
| MINOR CONGESTION CLEARS IN 10 KM | 5.0 | 10.5 | 36.8 | 47.4 | 31.6 |

13. What does this sign message mean to you? Please circle the number of your answer.

SPEED 30-40 KM/H
NEXT 3 KM

1. The legal speed limit is 40 km/h for the next 3 km. 17.5 %
2. The average speed of the traffic is between 30 and 40 km/h for the next 3 km. 40.0 %
3. The recommended speed is 30 to 40 km/h for the next 3 km. 42.5 %
4. Don't know 0

14. What does this sign message mean to you? Please circle the number of your answer.

HEAVY CONGESTION
NEXT 3 KM

1. Heavy congestion starts in 3 km. 40.0 %
2. Heavy congestion ends in 3 km. 57.5 %
3. Don't know. 2.5 %

Is there anything else about changeable message signs you feel we should have asked about?

Do you have any other comments?

*THANK YOU FOR YOUR HELP*

WHEN THE QUESTIONNAIRE IS HANDED IN THE INTERVIEWER WILL CHECK THAT IT IS COMPLETED.

## TABLE 17: CHINESE-SPEAKERS SURVEY DEMOGRAPHICS

Total participants - 40

Age 16-25 ( 5 ) 12.50%

| Male ( 2 ) 40 % | Female ( 3 ) 60 % | Total ( 5 ) |
|---|---|---|
| PS ( 0 ) 0 % | PS ( 0 ) 0 % | PS ( 0 ) 0 % |
| HS ( 2 ) 100 % | HS ( 3 ) 100 % | HS ( 5 ) 100 % |
| U ( 0 ) 0 % | U ( 0 ) 0 % | U ( 0 ) 0 % |

Age 26-55 ( 29 ) 72.50%

| Male ( 20 ) 68.97% | Female ( 9 ) 31.03% | Total ( 29 ) |
|---|---|---|
| PS ( 3 ) 15.00 % | PS ( 2 ) 22.2 % | PS ( 5 ) 17.24 % |
| HS ( 13 ) 65.00 % | HS ( 7 ) 77.7 % | HS ( 20 ) 68.97 % |
| U ( 4 ) 20.00 % | U ( 0 ) 0 % | U ( 4 ) 13.79 % |

Age >55 ( 6 ) 15.00%

| Male ( 6 ) 100 % | Female ( 0 ) 0 % | Total ( 6 ) |
|---|---|---|
| PS ( 5 ) 83.3 % | PS ( 0 ) 0 % | PS ( 5 ) 83.3 % |
| HS ( 1 ) 16.67 % | HS ( 0 ) 0 % | HS ( 1 ) 16.67 % |
| U ( 0 ) 0 % | U ( 0 ) 0 % | U ( 0 ) 0 % |

All Ages ( 40 )

| Male ( 28 ) 70.00% | Female ( 12 ) 30.00% | Totals |
|---|---|---|
| PS ( 8 ) 28.57 % | PS ( 2 ) 16.67 % | PS ( 10 ) 25.00 % |
| HS ( 16 ) 57.14 % | HS ( 10 ) 83.33 % | HS ( 26 ) 65.0 % |
| U ( 4 ) 14.29 % | U ( 0 ) 0 % | U ( 4 ) 10.00 % |

## TABLE 18: CHINESE-SPEAKERS SURVEY RESULTS

Please check appropriate space

Sex: Male 28
Female 12

NOTE: All percentages are out of 40 except where stated.

Age: 16-25 5
26-55 29
over 55 6

Level of Education: Grade 1-8 10
Grade 9-13 26
University or Post Secondary 4

FOR ALL THE FOLLOWING QUESTIONS PLEASE IMAGINE YOU ARE TRAVELLING ON HIGHWAY 401 AND YOU SEE A SIGN ABOVE THE ROADWAY WITH A MESSAGE ON IT.

1. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving very slowly (stop and go). Please rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, down to 3 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

| | | (X) |
|---|---|---|
| SEVERE TRAFFIC DELAY STARTS IN 1 KM | 5.0% | 55.0% |
| HEAVY CONGESTION STARTS IN 1 KM | 17.5% | 52.5% |
| TRAFFIC JAM STARTS IN 1 KM | 42.5% | 37.5% |

2. Which of the following traffic sign messages do you think best indicates that the traffic ahead on the highway is moving somewhat slowly (slow moving with occasional stops). Please rank the following traffic sign messages, with 1 for most preferred, 2 for next most preferred, and 3 for least preferred.

| | | (X) |
|---|---|---|
| MODERATE CONGESTION STARTS IN 1 KM | 10.0% | 57.5% |
| TRAFFIC DELAY STARTS IN 1 KM | 42.5% | 35.0% |
| TRAFFIC SLOWDOWN STARTS IN 1 KM | 20.0% | 35.0% |

3. How far in advance of the start of unusual congestion do you think information about the delay should be given to drivers?
Please circle the number of your answer.

| | | |
|---|---|---|
| 1. | less than 2 km. (about 1 mile) | 10.0% |
| 2. | 2 to 3 km. (about 1-2 miles) | 22.5% |
| 3. | 4 to 5 km. (about 2 1/2 to 3 miles) | 22.5% |
| 4. | 6 to 8 km. (about 4 - 5 miles) | 22.5% |
| 5. | more than 8 km (more than 5 miles) | 22.5% |

4. Imagine there is a MAJOR ACCIDENT ahead.

Which of the messages below would you prefer? Rank these messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Even if 2 of the choices seem equal, please decide between them and do not give them the same ranking.

| | | (X) |
|---|---|---|
| MAJOR ACCIDENT AHEAD<br>1 KM BEFORE AVENUE ROAD | 12.5% | 42.5% |
| MAJOR ACCIDENT AHEAD<br>20 MINUTE DELAY | 22.5% | 37.5% |
| MAJOR ACCIDENT AHEAD<br>LEFT 2 LANES BLOCKED | 12.5% | 37.5% |
| MAJOR ACCIDENT AHEAD<br>CONGESTION FOR 5 KM | 20.0% | 50.0% |

5. The traffic is STOP AND GO ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc, down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| DELAY 3 TO 7 MIN.<br>NEXT 3 KM. | 32.5% | 30.0% |
| SPEED 20-40 KM/H.<br>NEXT 3 KM. | 37.5% | 10.0% |
| HEAVY CONGESTION<br>NEXT 3 KM. | 15.0% | 50.0% |
| TRAVEL TIME 5-9 MIN.<br>NEXT 3 KM. | 5.0% | 37.5% |

6. The traffic is MOVING SLOWLY WITH OCCASIONAL STOPS ahead of you. Rank the following traffic sign messages: with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| DELAY 1 TO 3 MIN.<br>NEXT 3 KM. | 32.5% | 32.5% |
| SPEED 40-60 KM/H.<br>NEXT 3 KM. | 37.5% | 12.5% |
| MODERATE CONGESTION<br>NEXT 3 KM. | 10.0% | 57.5% |
| TRAVEL TIME 3-5 MIN.<br>NEXT 3 KM. | 10.0% | 35.0% |

7. Traffic is SLOW BUT KEEPS MOVING. Rank the following traffic sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| DELAY UP TO 1 MIN<br>NEXT 3 KM | 30.0% | 32.5% |
| SPEED 60-80 KM/H<br>NEXT 3 KM | 37.5% | 10.0% |
| MINOR CONGESTION<br>NEXT 3 KM | 12.5% | 55.0% |
| TRAVEL TIME 2-3 MIN<br>NEXT 3 KM | 10.0% | 35.0% |

**NOTE: Row percentages are out of number of respondents who understood message.**

8. You are travelling on Highway 401 in the EXPRESS lanes.
   You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Which one of the following actions would you take? Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | SLOW DOWN IMMEDIATELY % | TAKE COLLECTOR LANES AT NEXT OPPORTUNITY % | SLOW DOWN WHEN I SEE TRAFFIC BACKUP % | (X%) |
|---|---|---|---|---|
| SPEED 40-60 KM/H NEXT 10 KM | 65.7 | 20.0 | 25.7 | 12.5 |
| ICY CONDITIONS AHEAD | 80.0 | 4.0 | 16.0 | 37.5 |
| MODERATE CONGESTION CLEARS IN 10 KM | 11.8 | 23.5 | 64.7 | 57.5 |
| ACCIDENT 1 KM AHEAD | 57.1 | 28.6 | 28.6 | 30.0 |
| HEAVY CONGESTION CLEARS IN 3 KM | 31.6 | 42.1 | 42.1 | 52.5 |
| MAJOR ACCIDENT 1 KM AHEAD | 61.5 | 50.0 | 26.9 | 35.0 |
| HEAVY CONGESTION STARTS IN 1 KM | 31.6 | 57.9 | 36.8 | 52.5 |
| HEAVY CONGESTION STARTS IN 1 KM REDUCE SPEED | 70.0 | 45.0 | 25.0 | 50.0 |
| HEAVY CONGESTION CLEARS IN 10 KM | 26.3 | 68.4 | 31.6 | 52.5 |
| SPEED 40-60 KM/H AHEAD REDUCE DELAY USE COLLECTOR LANES | 69.0 | 62.1 | 10.3 | 27.5 |

NOTE: Row percentages are out of number of respondents who understood message.

9. You are travelling on Highway 401 in the EXPRESS lanes.
You CAN'T SEE any traffic problem ahead.
You are planning to TRAVEL ALL THE WAY ACROSS TORONTO.

You see the following messages on a traffic sign above the roadway. Use a checkmark (√) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE ON THE EXPRESS LANES | | SLOW DOWN IMMEDIATELY | CHANGE TO COLLECTOR LANES AT NEXT OPPORTUNITY | SLOW DOWN WHEN I SEE TRAFFIC BACKUP |
|---|---|---|---|---|
| | (X%) | % | % | % |
| ACCIDENT 3 KM AHEAD | 32.5 | 66.7 | 29.6 | 37.0 |
| HEAVY CONGESTION AHEAD REDUCE DELAY USE COLLECTOR LANES | 45.0 | 22.7 | 86.4 | 22.7 |
| MAJOR ACCIDENT 3 KM AHEAD. | 35.0 | 57.7 | 46.2 | 26.9 |
| MODERATE CONGESTION AHEAD REDUCE DELAY USE COLLECTOR LANES | 50.0 | 20.0 | 85.0 | 25.0 |
| HEAVY CONGESTION STARTS IN 3 KM | 50.0 | 45.0 | 45.0 | 40.0 |
| CONSTRUCTION STARTS IN 3 KM | 37.5 | 28.0 | 36.0 | 52.0 |
| 2 LEFT LANES BLOCKED 3 KM AHEAD | 27.5 | 31.0 | 17.2 | 55.2 |
| LEFT LANE BLOCKED 3 KM AHEAD | 27.5 | 31.0 | 17.2 | 55.2 |
| EXPRESS LANES CLOSED AHEAD USE COLLECTOR LANES | 35.0 | 15.4 | 100 | 23.1 |

10. You are travelling on Highway 401 in RUSH HOUR. Traffic is congested as it usually is in rush hour. Rank the following sign messages with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| NORMAL CONGESTION AHEAD<br>NEXT 5 KM | 20.0% | 30.0% |
| RUSH HOUR<br>CONDITIONS AHEAD<br>NEXT 5 KM | 30.0% | 30.0% |
| no message (blank sign) | 20.0% | 25.0% |
| time and/or weather messages<br>(eg TIME 4:31 - CLOUDY) | 30.0% | 25.0% |

11. You are travelling on Highway 401. Traffic is FLOWING FREELY. Rank the following messages, with 1 for most preferred, 2 for next most preferred, etc. down to 4 for least preferred. Please do not give any 2 messages the same rank.

| | | (X) |
|---|---|---|
| NORMAL TRAFFIC<br>NEXT 5 KM | 25.0% | 45.0% |
| no message (blank sign) | 35.0% | 2.5% |
| Messages giving directions which are also given on nearby signs<br>(eg AVENUE ROAD EXIT 1 KM) | 15.0% | 25.0% |
| time and/or weather messages<br>(eg TIME 4:31 - CLOUDY) | 25.0% | 17.5% |

NOTE: Row percentages are out of number of respondents who understood message.

12. You are travelling on Highway 401 in the COLLECTOR lanes. You are planning to EXIT in 6 km, which is 3 exits beyond where you are now.

You see the following messages on a traffic sign above the roadway. Use a checkmark (✓) to show which action you will take. You can choose more than one action.

| YOUR MESSAGE IN THE COLLECTOR LANES | (X%) | SLOW DOWN IMMEDIATELY % | LEAVE HIGHWAY AT NEXT EXIT % | SLOW DOWN WHEN I SEE TRAFFIC BACKUP % | CHANGE TO EXPRESS LANES % |
|---|---|---|---|---|---|
| MODERATE CONGESTION CLEARS IN 10 KM | 57.5 | 11.8 | 23.5 | 52.9 | 17.6 |
| SPEED 20-40 KM/H NEXT 3 KM | 10.0 | 80.6 | 36.1 | 8.3 | 8.3 |
| SPEED 20-40 KM/H NEXT 10 KM | 10.0 | 75.0 | 38.9 | 13.9 | 8.3 |
| HEAVY CONGESTION STARTS IN 1 KM | 52.5 | 36.8 | 78.9 | 21.1 | 0 |
| CONSTRUCTION STARTS IN 1 KM REDUCE SPEED | 40.0 | 66.7 | 33.3 | 16.7 | 8.3 |
| HEAVY CONGESTION CLEARS IN 10 KM | 52.5 | 26.3 | 78.9 | 26.3 | 0 |
| LEFT LANE BLOCKED 1 KM AHEAD | 27.5 | 37.9 | 13.8 | 48.3 | 3.4 |
| COLLECTORS CLOSED AHEAD THROUGH TRAFFIC USE EXPRESS LANES | 42.5 | 13.0 | 56.5 | 13.0 | 34.8 |
| MINOR CONGESTION CLEARS IN 10 KM | 50.0 | 5.0 | 30.0 | 60.0 | 5.0 |

13. What does this sign message mean to you? Please circle the number of your answer.

SPEED 30-40 KM/H
NEXT 3 KM

1. The legal speed limit is 40 km/h for the next 3 km. 22.5%
2. The average speed of the traffic is between 30 and 40 km/h for the next 3 km. 10.0%
3. The recommended speed is 30 to 40 km/h for the next 3 km. 50.0%
4. Don't know 17.5%

14. What does this sign message mean to you? Please circle the number of your answer.

HEAVY CONGESTION
NEXT 3 KM

1. Heavy congestion starts in 3 km. 32.5%
2. Heavy congestion ends in 3 km. 22.5%
3. Don't know. 42.5%

Is there anything else about changeable message signs you feel we should have asked about?

Do you have any other comments?

*THANK YOU FOR YOUR HELP*

WHEN THE QUESTIONNAIRE IS HANDED IN THE INTERVIEWER WILL CHECK THAT IT IS COMPLETED.